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The Linsenmaier Chrysididae collection housed in the Natur-Museum Luzern (Switzerland) and the main results of the related GBIF Hymenoptera Project (Insecta)

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Abstract

Historical notes on Walter Linsenmaier, his entomological career and his Chrysididae collection are given. The purpose of this article is to supply the main results obtained during the GBIF digitalization project and the subsequent reorganization of the Chrysididae collection housed in the Natur-Museum Luzern (Switzerland); we also provide the complete list of the 720 taxa described by the Swiss author (species-group and genus-group names). Observations on the type material is given. A new synonymy (valid name is first) is proposed for: *C. consanguinea* Mocsáry, 1889 = *C. consanguinea iberica* Linsenmaier, 1959, **syn. nov.**; *C. pyrophana* Dahlbom, 1854 = *C. pyrophana* var. *orionea* Linsenmaier, 1951, **syn. nov.**; *Hedychridium elegantulum* du Buysson, 1887 = *H. hybridum* Linsenmaier, 1959, **syn. nov.**; *H. perpunctatum* Balthasar, 1953 = *H. insequosum* Linsenmaier, 1959, **syn. nov.**; *Euchroeus (Pseudospinolia) incrassatus* (Spinola, 1838) = *E. (P.) humboldti jerichoensis* Linsenmaier, 1959, **syn. nov.**. A new replacement name *Chrysis vulcanica* Rosa, **nom. nov.** is pro-

posed for *Chrysis brevicollis* Linsenmaier, 1987, nom praeocc., nec Mocsáry, 1899. The lectotype of *Chrysis auriceps* Linsenmaier, 1959 is designated.

Key words: Chrysidae, collection, Walter Linsenmaier, types, new synonymy

Introduction

Walter Linsenmaier was one of the most renowned Swiss painters and entomologists that ever lived. Linsenmaier was born on August 18, 1917 in Stuttgart (Germany). Only one year after his birth his family moved to Switzerland, where he lived until he passed away on October 31, 2000 at the age of 83. Linsenmaier was an artist, earning his first certification as a stucco worker, the same trade as his father, Paul. He then went on to earn a teaching degree in drawing and illustration from the Lucerne School of Arts. He became a professional illustrator specialising in nature illustrations for books and journals, such as "Du" and "Life Magazine", in the US. The books with his beautiful illustrations on tropical butterflies (*Tropische Schmetterlinge*) (Linsenmaier & Handschin 1949), Orchids (*Orchideen*) (Kupper & Linsenmaier 1952), and tropical birds (*Paradiesvögel und Kolibris*) (Sutter & Linsenmaier 1953) have been translated into several languages and are well known worldwide. The most famous published volume by Walter Linsenmaier is *Insects of the World* (Linsenmaier 1972), with 1,888 illustrations, each one a masterpiece. Linsenmaier's technique was based on pencil sketches, with very accurate and realistic paintings.

In 1951 Linsenmaier, together with his father Paul, a talented taxidermist, established one of the best private European museums in existence: the *Tierweltpanorama*. In the museum more than 800 stuffed animals were shown in their natural habitats: from Alpine regions, to the African Savannah, to the tropical forest of Borneo. For many years the *Tierweltpanorama* was the only natural science museum in the Canton of Lucerne, and the only natural science museum to display tropical animals. The museum closed in 2007. Additional information can be found in a specific volume published by the Natur-Museum (Linsenmaier 1995). When the *Tierweltpanorama* was dismantled, the Natur-Museum produced the documentary "*Tierweltpanorama. Das Erbe der Familie Linsenmaier*" (CH, 2008, documentary, 20 min., colour) by Stephan Heiniger.

The Natur-Museum Luzern dedicated three temporary exhibits to the works of Walter Linsenmaier. A fourth, entitled *Wunderwelt Insekten*, has been open to the public since June 21, 2002 and is one of the most attractive areas in the museum. The exhibit includes all of the insect families in the Linsenmaier collection and won the prestigious Swiss Museum Prize in 2003.

In 1982 Walter Linsenmaier was awarded an honorary doctorate from the University of Bern Science Department for his scientific and artistic achievements. In 1985 he received the *Innerschweizer Kulturpreis*, and in 1992 the *Ernst-Jünger-Preis für Entomologie* from the Federal State of Baden-Württemberg (Germany). More information on the life of Walter Linsenmaier can be found in various articles (Bolli 2000; Corti 1973; Herger 1995, 2000; Lannetta 1986; Niehuis 1995, 1997, 2001a). The Natur-Museum Luzern acquired Walter Linsenmaier's insect collection, consisting of approximately 250,000 specimens (of which 120,000 Hymenoptera) housed in 1,100 drawers, as well the entire Chrysidae collection.

Different Hymenoptera taxa were named after Walter Linsenmaier (e.g. *Leptochilus (Lionotulus) linsenmaieri* Gusenleitner, 1971; *Nomada linsenmaieri* Schwarz, 1974; *Evagetes linsenmaieri* Wolf, 1970) and even one cuckoo wasp: *Parnopes grandior* ssp. *linsenmaieri* Agnoli, 1995 (Fig. 1).

Linsenmaier's Patrimony

Walter Linsenmaier is universally recognized as one of the most important entomologists working on Chrysidae. Over the course of his entomological career, in more than twenty publications, Linsenmaier described 15 new subgenera, some of which were later upgraded to generic level, and 705 new species and subspecies (APPENDIX A). Linsenmaier left behind a significant iconographic patrimony which includes approximately 2,170 published line drawings and pictures, with 70 colour illustrations in 20 plates (APPENDIX C). His studies were revolutionary and his paper "Linsenmaier 1959a" continues to be the most influential reference for all European entomologists studying Chrysidae. The scope of his entomological work is particularly impressive given the fact that he was

completely self-taught, had no scientific background, and received neither grants nor assistance from any scientific institution.

However, numbers alone cannot demonstrate the importance of Linsenmaier's contributions in the study of this family. One could go so far as to say that he actually revolutionised the systematic arrangement of the Chrysididae family, formalising the species-group concept. Each group includes taxa with similar characteristics, valid enough to isolate it from other groups, but not enough so to define a distinct genus. While it is often an artificial and subjective classification, nonetheless it is one that is extremely useful to anyone wanting to study the taxonomy and systematics of these insects. His species-group system is used and applied by all the entomologists, even those who do not follow the same systematic approach (Kimsey & Bohart 1991).



FIGURE 1. *Parnopes grandior linsenmaieri* Agnoli, 1995. Photo: Marcello Romano.

Historical overview

The beginning of the scientific career of Walter Linsenmaier with Chrysididae dates back to 1943, when the art magazine “*Du. Die Zeitschrift der Kultur*” commisioned him to draw a colour illustration of a cuckoo-wasp for the cover. When Linsenmaier began his study, the systematics in use was the one developed by Mocsáry (1889), based on the genera and generic subdivisions proposed by Dahlbom (1854) and named by Lichtenstein (1876) in the genus *Chrysis*. Dahlbom's system for the genus *Chrysis* was arranged according to the number of apical teeth on the last visible tergite. Lichtenstein adopted the classification given by Dahlbom, originally based on eight

Phalangis, naming them in accordance with the number of anal teeth: *Phalanx I:ma* (*Chrysides ano integerrimae*) became *Olochrysis*, and so on with the names: *Gonochrysis*, *Monochrysis*, *Dichrysis*, *Trichrysis*, *Tetrachrysis*, *Pentachrysis*, and *Hexachrysis*. The names *Trichrysis*, *Pentachrysis* and *Hexachrysis* were used by Lisenmaier as valid subgenera. After Mocsáry's and before Lisenmaier's publications, only a few other authors contributed to the development of the family's higher systematic arrangement, the most important of which are: Abeille de Perrin (1879), Bischoff (1910, 1913), du Buysson (1891-1896), and Semenov-Tian-Shanskij (for a more detailed historical overview on the Chrysididae family see Kimsey & Bohart (1991) and Rosa (2006)). Other important references and more updated monographs which Lisenmaier used were those of Trautmann (1927) and Berland & Bernard (1938). In particular *Die Goldwespen Europas* (Trautmann 1927) appears to be the primary comparative work for identification of the species.

Lisenmaier began studying on his own, leaving behind the classical texts and relying on his own intuition. The first result of these studies was *Die europäischen Chrysididen (Hymenoptera). Versuch einer natürlichen Ordnung mit Diagnosen* (1951), essentially a first draft of 1959a which was published eight years later. During these years Lisenmaier collected thousands of specimens from all over the world, especially from the Palaearctic Region. Many famous entomologists assisted Lisenmaier in his unrelenting work: Berland (France), Bytinski-Salz (Palestine), Mavromoustakis (Cyprus), Marten (Spain), de Andrade (Portugal), Naef and de Beaumont (Switzerland and North Africa), Puławski (Poland and North Africa), Schlaefle (Switzerland), Seidenstücker (Turkey), Tsuneki (Japan), Verhoeff (Mediterranean countries), Alin (Manchuria) and many more. With the exception of the former Soviet countries, Lisenmaier was able to acquire a large sample of the Palaearctic species, from West (Portugal) to East (Japan) and the Mediterranean countries. He dissected and drew hundreds of genital capsulae from the taxa received.

These drawings are at the foundation of his revolutionary work. Lisenmaier was not the first author to examine and draw the genitalia of the Chrysididae: the entomologists Radoszkowski (1889) and Edney (1940-1954) also studied the chrysidid genitalia, however Lisenmaier was the first to combine the shape of the genitalia with other morphological characteristics which had not previously been considered, such as the relative length of the antennal segment, the shape of the mesopleuron, the width of the ovipositor, etc. This tremendous effort resulted in the creation of a detailed image gallery (711 drawings), which was included in the monograph and is still in use in the study of the Palaearctic species.

When his monograph *Revision der Familie Chrysididae (Hymenoptera) mit besonderer Berücksichtigung der europäischen Spezies* was published in 1959, it had a huge impact on the systematics of the family. Lisenmaier developed a rational and functional systematic based on his drawings and, at last, the family was reorganized in a more modern way. In fact, he was the first author to introduce the concept of "species-group", still in use today. Four supplements updating the information on the European fauna were published over the course of the next 40 years (1959b, 1968, 1987, 1997a). Lisenmaier (1959a) cited Krombein (1957) work and other articles which included the subfamily Amiseginae in the Chrysididae. Lisenmaier excluded this subfamily from his work because it is not present in Europe. Currently the two subfamilies Amiseginae and Loboscelidiinae are not known from the Palaearctic Region (Kimsey & Bohart 1991) and were not discussed by Lisenmaier in his studies.

In 1959a, Lisenmaier described several new extra-Palaearctic subgenera (e.g. *Neochrysis*, *Neospinolia*, *Ipsiura*, *Prospinolia*, etc.), but did not revise anyone of these subgenera. His first paper on exotic species is dated 1982 and was based on Australian and Asian species of the subgenus *Primeuchroeus* Lisenmaier, 1968. In the same paper he also described several new Australian species from the genus *Chrysis*. In 1984 and 1985 Lisenmaier published two papers on South American species from the subgenus *Trichrysis* Lichtenstein and the genus *Neochrysis* Lisenmaier. During this period Lisenmaier was in competition with Kimsey (1985) and Bohart (1985a, b), who were studying the American species and preparing the volume "The Chrysidid Wasps of the World" (1991). Lisenmaier's papers are full of keys and drawings which assisted Bohart in synonymizing some species. Lisenmaier also wrote several important papers on the fauna of the Chrysididae of Palestine (1969), Canary Islands (1993), Arabian Peninsula (1994a), Switzerland (1997b) and North Africa (1999). The volumes on the Swiss and Arabian species include beautiful colour drawings.

Since Lisenmaier did not adhere to modern scientific conventions, in recent years a mistaken belief has cropped up among entomologists that: "Lisenmaier did not check the original types, therefore his identifications and interpretations could be wrong". This is not fully correct. Even though economic and political reasons prevented Lisenmaier from being able to visit all of the European and Soviet museums, he still managed to

examine many collections and types. Evidence of this is found in his writings, manuscripts, and in some of the European collections. According to his articles, he examined types and other materials from various collections in Bern (e.g. Ducke's types: Lisenmaier 1997a), Budapest (e.g. *Chrysis fulgida* var. *concolor* Mocsáry, 1912; Lisenmaier 1951: 82); Geneva (e.g. *Holopyga hispanica* Tournier, 1878; Lisenmaier 1987: 135), London (e.g. *Chrysis ignita* (Linnaeus, 1758), lectotype designation in Lisenmaier 1959a: 156); Paris (e.g. *Hedychridium gratiosum* Abeille, 1878; Lisenmaier 1959a: 54), Stockholm (e.g. *Chrysis equestris* Dahlbom, 1854; Lisenmaier 1959a: 163), and he also received some paratypes and other Russian specimens from Nikol'skaja during the 1960s, and before his second revision of the European species. Furthermore, notes and various drawings can be found in Lisenmaier's manuscripts on the types housed in Budapest and London (e.g. Smith's Chrysidae types, Fig. 1). Walter Lisenmaier, who was a good friend of the curator Laslo Móczár, examined the entire Mocsáry collection, the most important Chrysidae collection of his time, including the extra-Palaearctic types. He also labelled many types, discovering many new synonyms (e.g. *Chrysis (Trichrysis) mongolica* Mocsáry, 1914 = *Chrysis (Trichrysis) pellucida* du Buysson, 1889; Lisenmaier 1959a: 169). Moreover, Lisenmaier (1959a) examined types and other specimens from the museums of: Amsterdam, Basel, Helsinki, Lausanne, Leiden, Lund, S. Francisco, Washington and Zurich (Lisenmaier 1959a).

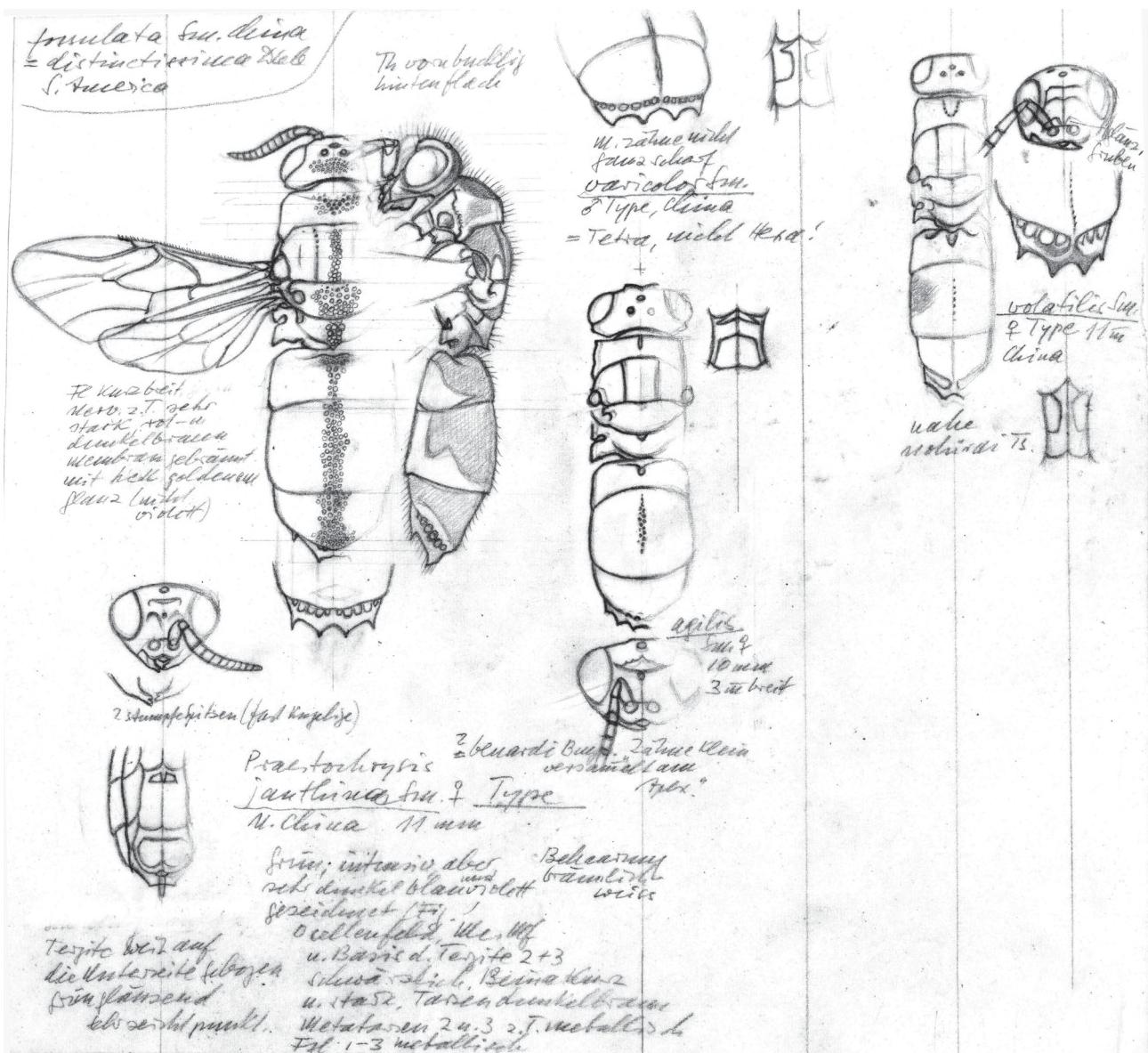


FIGURE 2. One of Linsenmaier's manuscript sheets on Smith's types.

Another common mistaken belief is that Lisenmaier described mostly colour variations or forms without real taxonomic value. As already underlined, Lisenmaier was not an academic scientist and this gap possibly influenced his work, also from a psicological point of view. In fact, especially at the beginning of his scientific career, he preferred to be more conservative and described new subspecies instead of new species. Taking in consideration his main revisions (Lisenmaier 1951, 1959a, 1959b, 1987, 1997a) he described 218 subspecies and 230 species: the 48,66% of the taxa described are subspecies. This situation is clearly shown in his first publication (Lisenmaier 1951), when he described only 1 new species and 27 new subspecies, of which twelve were later recognized as valid species and others will be soon elevated to species rank (e.g. *Stilbum calens* var. *enslini*), whereas some others are waiting for molecular systematic analysis (e.g. *Chrysis ignita* var. *deleta* and *C. ignita* var. *nipponica* nec Uchida, 1927).

We expect that many subspecies described by Lisenmaier are valid species, as demonstrated in the case of the European species described in the *Chrysis ignita* group. Lisenmaier (1959a) was the first author able to separate and key almost all Palaearctic known species of this complicated species-group. Over the years, all the European subspecies described by Lisenmaier from Central and North Europe have been elevated to species rank, and its validity was confirmed by means of molecular genetic analysis (Soon & Sarma 2011; Soon *et al.* 2014): *C. ignita* var. *clarinicollis* Lisenmaier, 1951 (elevated by Schmid-Egger *et al.* 1995); *C. ignita* var. *mediadentata* Lisenmaier, 1951 (elevated by Niehuis 2001b); *C. ignita* var. *mediata* Lisenmaier, 1951 (elevated by Lisenmaier 1959a); *C. ignita* var. *pseudobrevitarsis* (elevated by Lisenmaier 1959a); *C. ignita* var. *aurifera* Lisenmaier, 1951 (synonymised by Lisenmaier (1959a) with *C. ignita* ssp. *impressa* Schenck, 1856 which was later elevated to species rank by Schmid-Egger *et al.* (1995)); *C. ignita* ssp. *schenckiana* Lisenmaier, 1959a Mocsáry, 1912 (currently *C. schencki* Lisenmaier, 1968, elevated by Schmid-Egger *et al.* 1995); *C. longula* ssp. *subcoriacea* Lisenmaier, 1959a (elevated by Niehuis 1998a); *C. rutiliventris* ssp. *vanlithi* Lisenmaier, 1959a (elevated by Soon *et al.* 2014); *C. mediata* ssp. *fenniensis* Lisenmaier, 1959a (elevated by Schmid-Egger *et al.* 1995, synonymised by Niehuis (2000) with *C. solida* Haupt, 1957); *C. mediata* ssp. *melaensis* Lisenmaier, 1968 (elevated by Strumia 1995). The current status of some souther European subspecies (*C. ignita* ssp. *bischoffi* Lisenmaier, 1959a; *C. magnidens* ssp. *pseudignita* Lisenmaier, 1987; *C. ruddii* ssp. *brevimarginata* Lisenmaier, 1959a) is not yet evaluated.

Nevertheless, some subspecific names should be considered only as local or individual varietis, since Lisenmaier described many sympatric subspecies and his concept of biological species was not strictly scientific: his definition of subspecies is thoroughly explained in the introduction of his main work (Lisenmaier 1959a). As already underlined by Arens (2001, 2002, 2004a, 2010, 2011) some species and subspecies proposed by Lisenmaier in the genus *Holopyga*, in the *Chrysis dichroa*-group and in the *Hedychridium roseum*-group have no systematic value, but represent only variants in coloration, punctuation or other morphological features. Often, it is a hard job for his epigones to clarify the taxonomical chaos that he has created following his personal interpretation of species and subspecies, as well as his interpretation of species described by other authors without a complete study of the type material.

The Lisenmaier Chrysidae collection

Walter Lisenmaier's Chrysidae collection is undoubtedly one of the most important collections in the world and may well be the most impressive in terms of the number of different types, taxa, and specimens collected. The collection includes 56,758 specimens, belonging to 2,412 taxa; 1,742 taxa are identified, 240 are labelled as "new taxa", and 430 are unidentified. Of particular interest is the total number of typical specimens: approximately 4,380 belonging to 809 different species, subspecies and varietis, of which 802 are primary types (579 holotypes, 6 lectotypes, 5 neotypes, 212 syntypes) belonging to 605 species, subspecies and varietis and 3,596 are secondary types (262 allotypes, 3039 paratypes, 295 paralectotypes) belonging to 483 species, subspecies and variations. A large number of secondary types (664), belonging to 36 taxa, were not labelled as types but could be considered as types for different reasons (see the following paragraphs). On the other side, about 800 specimens were labelled as types, but were found to be without type status (e.g. species never described, etc.; see the following paragraphs). The collection includes more primary types of Chrysidae than any other European museum: 450 in Paris, 400 in Budapest, 350 in St. Petersburg, and 300 in Berlin and London (data extrapolated from Kimsey & Bohart 1991). The collection also includes primary and secondary types described by other 29 authors (APPENDIX B).

The collection was acquired by the Natur-Museum Luzern in 2000 and transferred to the museum after Walter Linsenmaier's death in 2001. Thanks to funding from the GBIF (Global Biodiversity Information Facility) project, it was possible to catalogue, enter into the database, and reorganize the entire collection and all of the types. When acquired, the collection was in excellent condition, with perfectly prepared specimens. It consisted of six distinct smaller collections: types-collection, synoptic-collection, general-collection, doubles-collection, Perraudin's collection, and Naef's collection, as well as a few small miscellaneous boxes. During the GBIF databasing project the collections were merged, maintaining the same systematic order established by Linsenmaier.

Material and methods

The collection includes about 56,750 specimens and approximately 4,380 types. In addition to the types described by Linsenmaier, there are primary and secondary types belonging to 103 taxa (APPENDIX B), described by other 29 authors: Agnoli, Arens, Balthasar, Bischoff, Bohart, Bohart & Brumley, Bohart & Campos, Enslin, French, Hellén, Huber & Pengelly, Kimsey, Lefeber, Mader, Móczár, Niehuis, Perraudin, Reder, Rosa, Semenov, Strumia, Telford, Trautmann, Tsuneki, Zimmermann, and neotypes of species described by Dahlbom (Rosa & Vårdal 2015), Lepeletier and Linnaeus (Rosa & Xu, 2015). It includes taxa collected from all over the World, in more than 150 countries: Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, the Autonomous Island of Grande Comore, Azerbaijan, Bangladesh, Belarus, Belgium, Belize, Bengal, Benin, Bolivia, Bosnia-Herzegovina, Botswana, the British Indian Ocean Territory, the British Overseas Territory, Bulgaria, Burkina Faso, Burma, Cambodia, Cameroon, Canada, the Central African Republic, Chad, China, Colombia, Congo, Costa Rica, Croatia, Cuba, Cyprus, the Czech Republic, the Democratic Republic of the Congo, Denmark, "Deutsch-Ostafrika", the Dominican Republic, Ecuador, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Finland, France, "French Indochina", Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Hungary, India, Indonesia, Iraq, Iran, Israel, Italy, Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Kyrgyzstan, Laos, Lebanon, Lesotho, Liberia, Libya, Macedonia, Madagascar, Malawi, Malaysia, Mali, Morocco, Mauritania, Mexico, Moldavia, Mongolia, Montenegro, Morocco, Mozambique, Nepal, the Netherlands, New Caledonia, Niger, Nigeria, North Korea, Norway, Oman, Pakistan, Palestine, Panama, Papua New Guinea, Paraguay, Peru, the Philippines, Poland, Portugal, the Republic of Cape Verde, the Republic of Palau, the Republic of the Congo, Romania, Rwanda, São Tomé and Príncipe, Saudi Arabia, Senegal, Serbia, "Siam", Sierra Leone, Singapore, Slovakia, Slovenia, Somalia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tajikistan, Taiwan, Tanzania, Thailand, Tibet, Togo, Trinidad & Tobago, Turkey, Turkmenistan, the United Arab Emirates, the United Kingdom, Uganda, Ukraine, the Union of the Comoros, the U.S.A., Uzbekistan, Venezuela, Vietnam, Western Sahara, Yemen, Zambia, and Zimbabwe. Data taken from the collection were recently used for completing various checklists and regional papers (Madl & Rosa 2012; Paukkunen *et al.* 2014; Rosa *et al.* 2013, 2014; Rosa & Zettel 2011). Lastly, the Linsenmaier's Chrysidae collection includes specimens collected by more than 1,130 collectors.

GBIF project

Entering the entire collection into the database took almost two years. The final file includes about 1,500,000 entries. The GBIF database has been organized using Linsenmaier's system, with subdivisions into genera and subgenera. The systematic classification of the genera proposed by Kimsey & Bohart (1991), currently used in Fauna Europaea (www.faunaeur.org) (Rosa & Soon 2012) was not taken into consideration. In fact, the system which they proposed would radically change the order of genera and species provided by Linsenmaier. Moreover, it is either not followed at all, or is only partially accepted, by many European authors (e.g. Arens 2001, 2002, 2004b, 2014; Kunz 1994, Mingo 1994, Martynova & Fateryga 2014, etc.). For this reason it was decided not to change Linsenmaier's classification, making it possible for anyone who uses his publications as a reference to easily find the specimens and types in the database and in the collection.

The GBIF project included the following steps: digitalization of all taxonomical data, geographical references, and all other data recorded on labels; research of the correct and current names of locations and of administrative counties and countries; identification of sexes, where not specified by Linsenmaier (with several exceptions, e.g.

the subgenus *Elampus*) or where more than three specimens were affixed to the same label without further indications. These identifications of sexes have been entered into the database, but not under the individual specimens; in the cases in which the original label was clearly wrong, the identification of sexes in the database has been changed. In terms of type evaluation, Linsenmaier often labelled specimens after the description of the taxa. This fact has led to misunderstanding, misinterpretation, and confusion (see later). Furthermore, the label information often did not match the information given in the original description. Only in 43% of the cases was there a perfect match between the information given in the original description and the types in the collection. These cases are detailed in the next chapters.

Specimens not labelled as types by Linsenmaier, but which nevertheless belong to the type series, have been given red labels, such as “SYNTYPE P. Rosa vidit 2010 GBIF Chrysidae” or “PARATYPE P. Rosa vidit 2010 GBIF Chrysidae”; taxa labelled by Linsenmaier as holotype, allotype and paratype, but never published, are therefore not valid taxa, and have been given the white label: “NO TYPE P. Rosa vidit 2010 GBIF Chrysidae”; specimens labelled as types by Linsenmaier, but labelled as such after the original description, have been given the same white label. Russian labels written in cyrillic have been translated by Liubov' Fedorova (Bernareggio, Italy); corrections to the data entered were made with the help of Gabriella Fossati (Villanova di Bernareggio, Italy). Despite these efforts, some errors are certainly present in the final tabulation. The digitalisation of the Linsenmaier-Chrysidae collection now allows for online access.



FIGURE 3. General collection, large box (32 x 56 cm), box number 1132.

The reorganization of the Linsenmaier collection

The collection was entirely reorganized by the first author of this paper (P. R.). It was originally subdivided into seven separate collections (Figs. 3–9): (i) types-collection (Fig. 5); (ii) synoptic collection (Fig. 6); (iii) general collection (Figs. 3, 4); (iv) Naef's collection (Fig. 7); (v) Perraudin's collection (Fig. 8); (vi) duplicates-collection (Fig. 9) and (vii) miscellaneous and unidentified material mostly on loan, which was partially sent back to the owners. The fragmentation of the collection caused confusion among the entomologists, who examined it after its arrival at the Natur-Museum. In some cases (e.g. Arens 2004), the specimens originally selected as types by Linsenmaier, but never published, were not found because they had been placed in different boxes and in different collections. Holotypes, syntypes, and paratypes belonging to the same type series were spread in different

collections and were difficult to find. For this reason all the collections were merged together in one collection. Now the new collection consists of 138 large boxes subdivided into plastic units. Each individual specimen has been given a USI (Unique Specimen Identifiers) bar-code label (Fig. 10). Each label is numbered and has a special computer readable symbol used to track specimens in the inventory database, including all related data (type status, references, collection data, general information, etc.). In the same way of the GBIF database, the collection was organised following Linsenmaier's systematics, making possible for anyone who uses his publications as a reference to easily find the specimens and types in the collection. We left the species identification given by Linsenmaier, even if a certain number of misidentified specimens was found (Arens 2001, 2002, 2004a), in most cases resulting for his omission to prepare the male genitalia. As a memory of Linsenmaier's work, we here describe the Linsenmaier collection as it was, when it arrived in the Natur-Museum, Luzern.



FIGURE 4. General collection, medium box (25 x 30 cm), box number 1116.

The original collection. Linsenmaier's collection was in excellent condition, with perfectly prepared specimens. Walter Linsenmaier was a famous artist long before he was an entomologist. His artistic inclination is evident in the arrangement of the specimens in his collection. The bottoms of the boxes in the general collection were of two colours, grey or blue, depending on their size and on the period in which they were purchased. Specimens pinned or prepared on transparent labels have a grey or blue coloured card separating the insects from their location label. Using this organizational method, the collection was visually well-ordered and specimens were clearly highlighted.

The collection consisted of 199 boxes, divided as follows: 109 medium format (25 x 30 cm); 24 large format (32 x 56), 56 medium-large format (30 x 40); and 23 small format (19 x 26), as well as some other small boxes of varying sizes containing unidentified specimens.

General collection (Figs 3, 4). The general collection included approximately 40,000 specimens in 133 boxes. As in any private collection, many aspects were changed over the years. Some of the most significant changes were both practical and aesthetic: the collection was initially stored in small boxes (25 x 30 cm) with a grey background (bottom and lateral sides, painted by Linsenmaier himself). In the late seventies Linsenmaier bought some larger boxes (32 x 56 cm) with a light blue background. Furthermore, some of the small boxes have a light blue background and are more recent, but it is unknown whether they were purchased before the larger boxes or simultaneously. As mentioned earlier, Linsenmaier placed a coloured label between the insect and the location label. Initially this label was grey, in keeping with the background colour of the boxes. When the collection changed, with the introduction of new boxes, new specimens entered into the collection were given a light blue label. Currently, grey and light blue coloured labels are mixed together in the collection. Over the years, given the continuous increase in the number of species and specimens, Linsenmaier established different collections: (i) the types-collection, (ii) the synoptic collection, and (iii) the duplicates-collection.



FIGURE 5. Image from the Types-collection, medium-large box (30 x 40 cm), box number 1.

Types-collection (Fig. 5). The types-collection included holotypes and allotypes described by Lisenmaier, from his first publication (Lisenmaier 1951) to his last (Lisenmaier 1999). The collection was divided according to the year of publication, with species placed in the order in which they were described. Unfortunately this collection does not fully represent all of the taxa described, and many of the holotypes were moved to the synoptic and general collections. Furthermore, many specimens labelled as 'type' are not actually types (see below). The collection included 1,092 specimens housed in 5 boxes. Almost all of the holotypes were labelled with numbers, but this numerical order was incorrect. In fact numbers were assigned also to some allotypes, as well as to specimens with no type status. Other holotypes of species considered as synonyms by Lisenmaier were found in the general and synoptic collections which were not numbered.



FIGURE 6. Image from the synoptic collection (box 30 x 40 cm), box number 1169.

Synoptic collection (Fig. 6). The synoptic collection included male and female from each taxon present in the collection. This was very useful in that it provided an overview of the taxa subdivided into genera and species-groups. The collection included about 4,350 specimens housed in 28 boxes.

Satellite Collections (Naef's and Perraudin's collections) (Figs 7, 8). Over the years, Linsenmaier bought or received various other collections. One of the most important was the Enslin Chrysidae collection, which he fully incorporated in the early 1950s. The other two most important collections received were the Naef and the Perraudin collections, which were kept separately though a large portion of the specimens collected by these two entomologists was kept with the general collection.

Naef's collection, probably acquired at some point during the 1970s, appears to have been reordered by Linsenmaier, mostly in 1974. The collection includes 2,426 specimens housed in 6 boxes. Perraudin's collection, received by Linsenmaier in the 1990s, was not entirely reorganized by him and therefore, in some cases, the specimens are not properly identified. The collection includes 3,786 specimens housed in 14 boxes.

Duplicates-collection (Fig. 9). The duplicates-collection included more than 5,000 specimens housed in 13 boxes. These specimens were set aside by Linsenmaier for future exchange with other entomologists or for gifts.



FIGURE 7. Image from Naef's collection (box 30 x 40 cm), box number 1015.



FIGURE 8. Image from Perraudin's collection (box 30 x 40 cm), box number 1001.

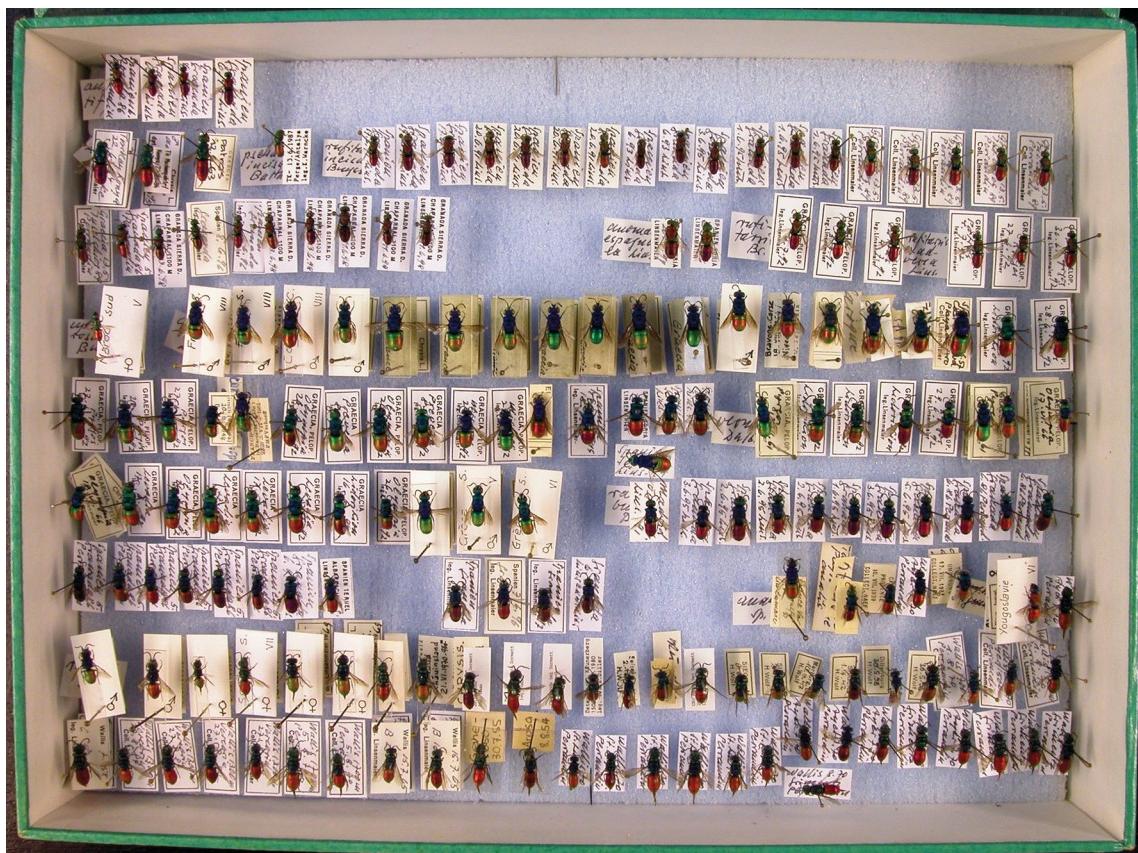


FIGURE 9. Image from the duplicates-collection, small box (19 x 26 cm), box number 14.

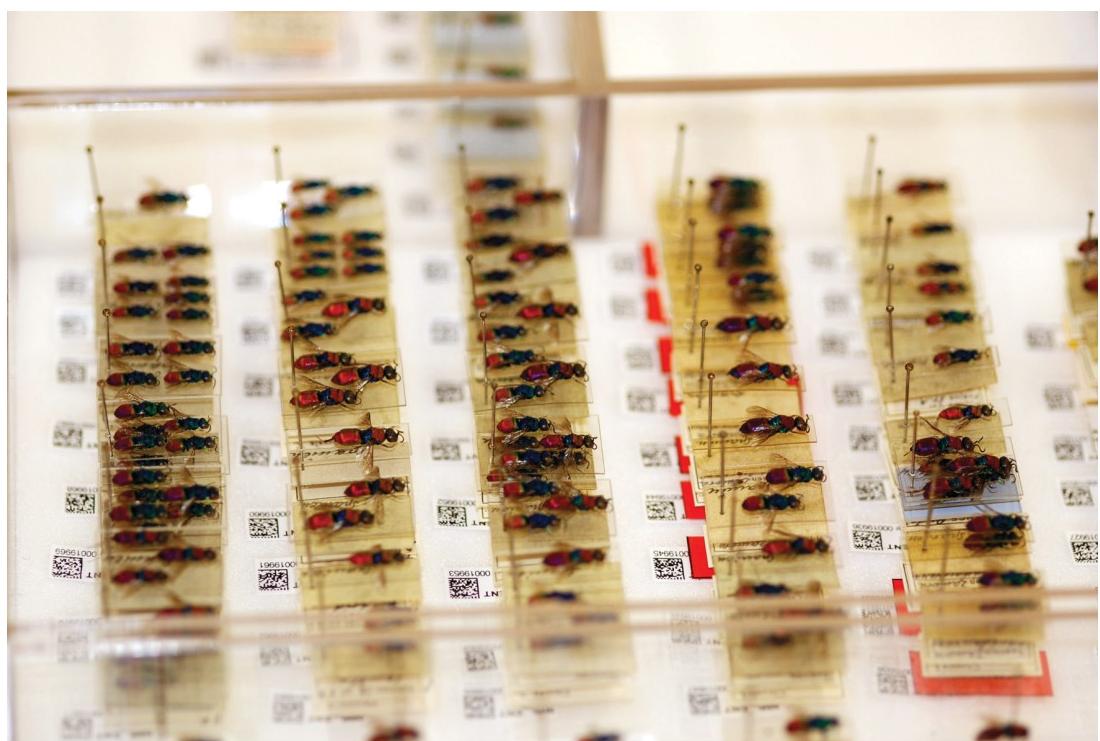


FIGURE 10. The new plastic unit with USI labels.

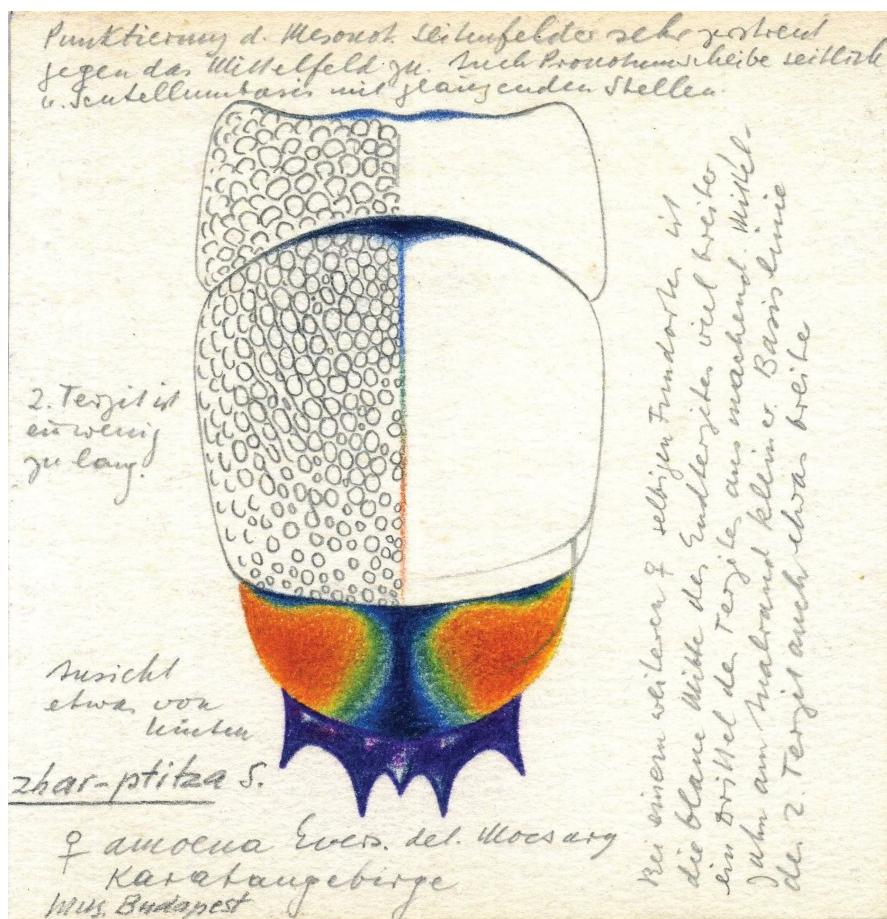


FIGURE 11. *Chrysis (Pentachrysis) zharpitza* Semenov-Tian-Shanskij. Image taken from the manuscripts.

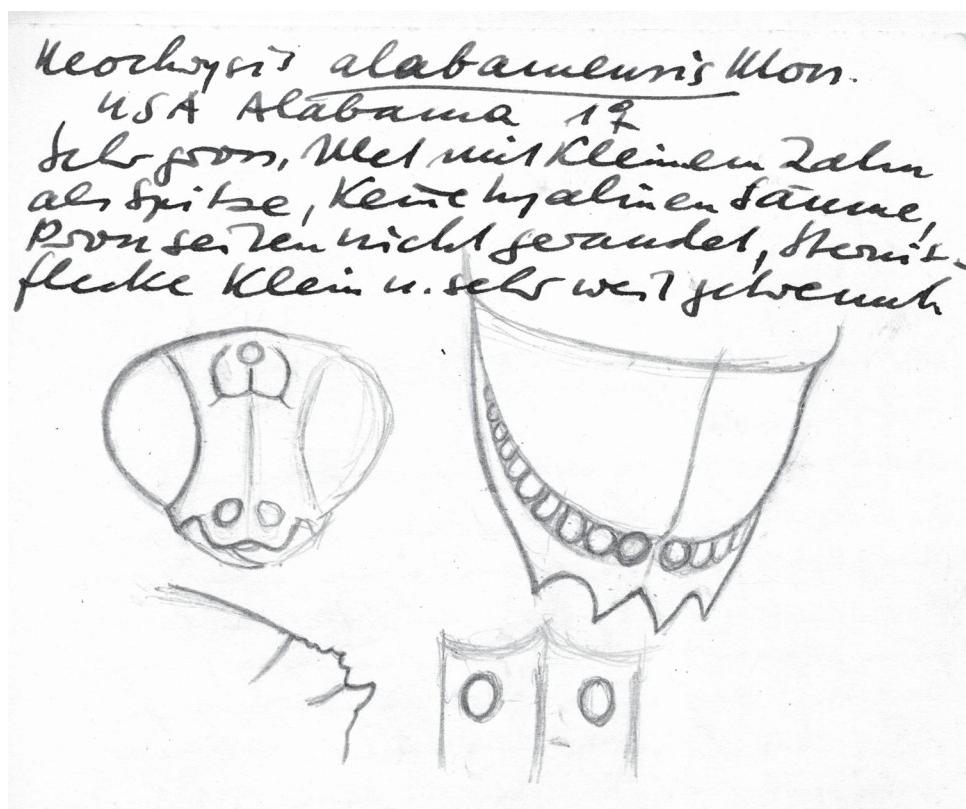


FIGURE 12. *Neochrysis alabamensis* (Mocsáry). Image taken from the manuscripts.

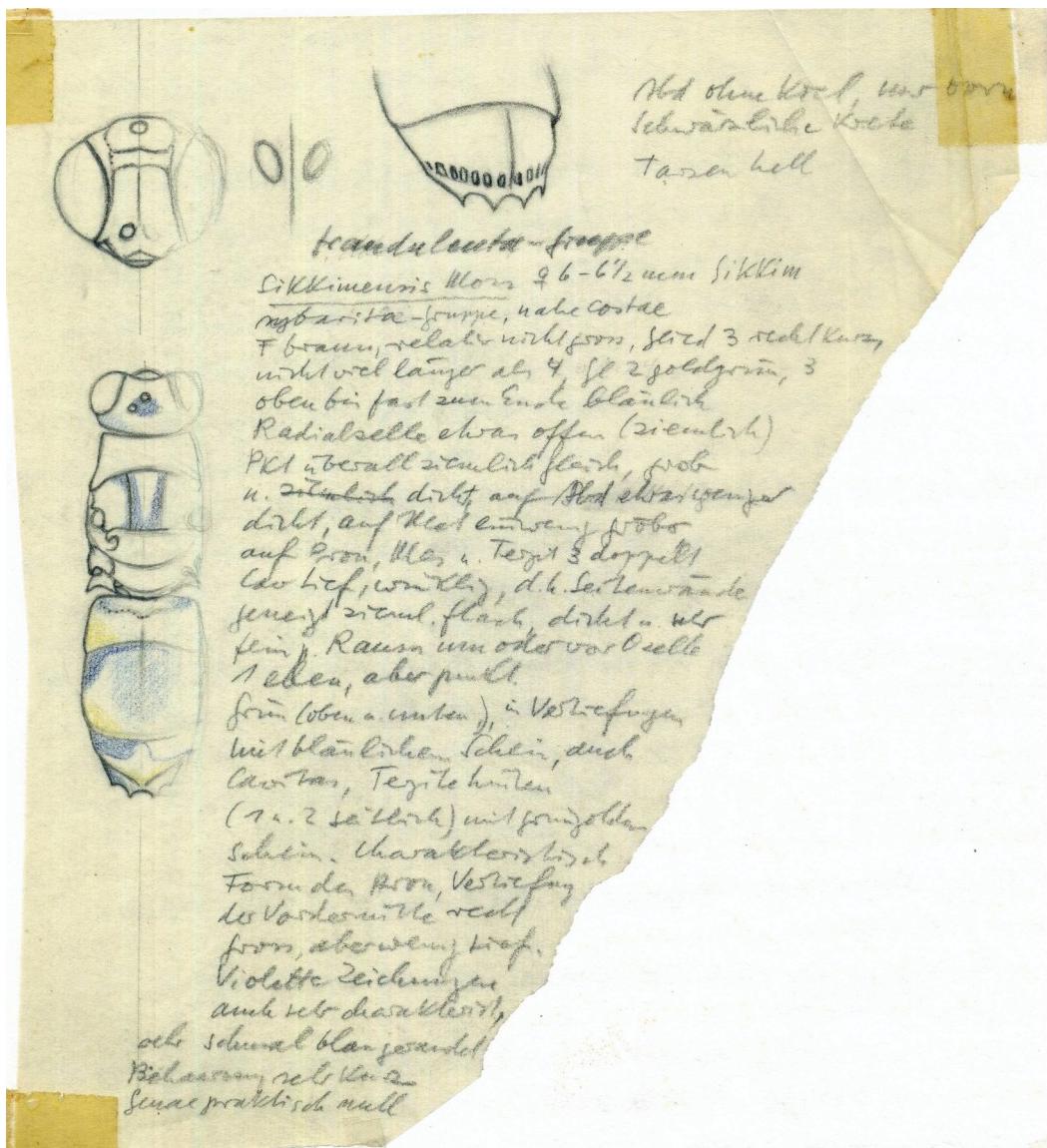


FIGURE 13. *Chrysis sikkimensis* Moesáry. Image taken from the manuscripts.

Manuscripts

Over the years one of us (P.R.) reorganized Lisenmaier's manuscripts. These manuscripts include not-yet-published descriptions of new species and two full unpublished papers. While many entomologists were aware of his volume in preparation on the Turkish species (Niehuis 2001a), very few knew that Lisenmaier also wrote a volume on the species of sub-Saharan Africa (Madl & Rosa 2012). The former of the two papers remained unpublished due to the author untimely death, while, in the latter case, it is thought that Lisenmaier most likely encountered difficulty in studying the type material and the enormous variety of new species discovered, confirming the fact that little or nothing is known of that entire geographic region, excluding the South African fauna. Descriptions and original drawings are available in the collection for further reference (Figs 11–13).

In addition to the manuscripts, handwritten notes and various other documents have also been examined, bringing to light some important information. Specifically, one author (D.W.) discovered the codes which Lisenmaier used when collecting specimens in Canton Wallis, Switzerland. The following codes have now been deciphered: Wallis A = Brig; Wallis B = Sierre; Wallis C = Sion; Wallis D = Martigny.

Observations on some specimens and labels found in the collection

Below is a summary of several notes obtained during the GBIF project and the re-organization of the chrysidid collections.

a) Preparation of the chrysidids

Linsenmaier's method for preparing insects was well known and bordered on obsessive. In early years Linsenmaier would re-prepare badly prepared or badly pinned specimens which he received. Many specimens in the collection have a hole in the thorax, left by the entomological pin. This hole was filled with wax and later painstakingly pockmarked using the tip of a pin in order to reproduce the textured look of the insect thorax (Fig. 14). In other cases, Linsenmaier cut the pin and then coloured the top pin remaining in the specimen with the same colour as that of the thorax (Fig. 15).

Often two or more specimens are perfectly prepared and glued on the same transparent label for aesthetic motive, even if they were collected on different days or even in different localities (Figs 4, 10).



FIGURE 14. *Hedychridium boharti* (nomen in collection): thorax repaired with wax.

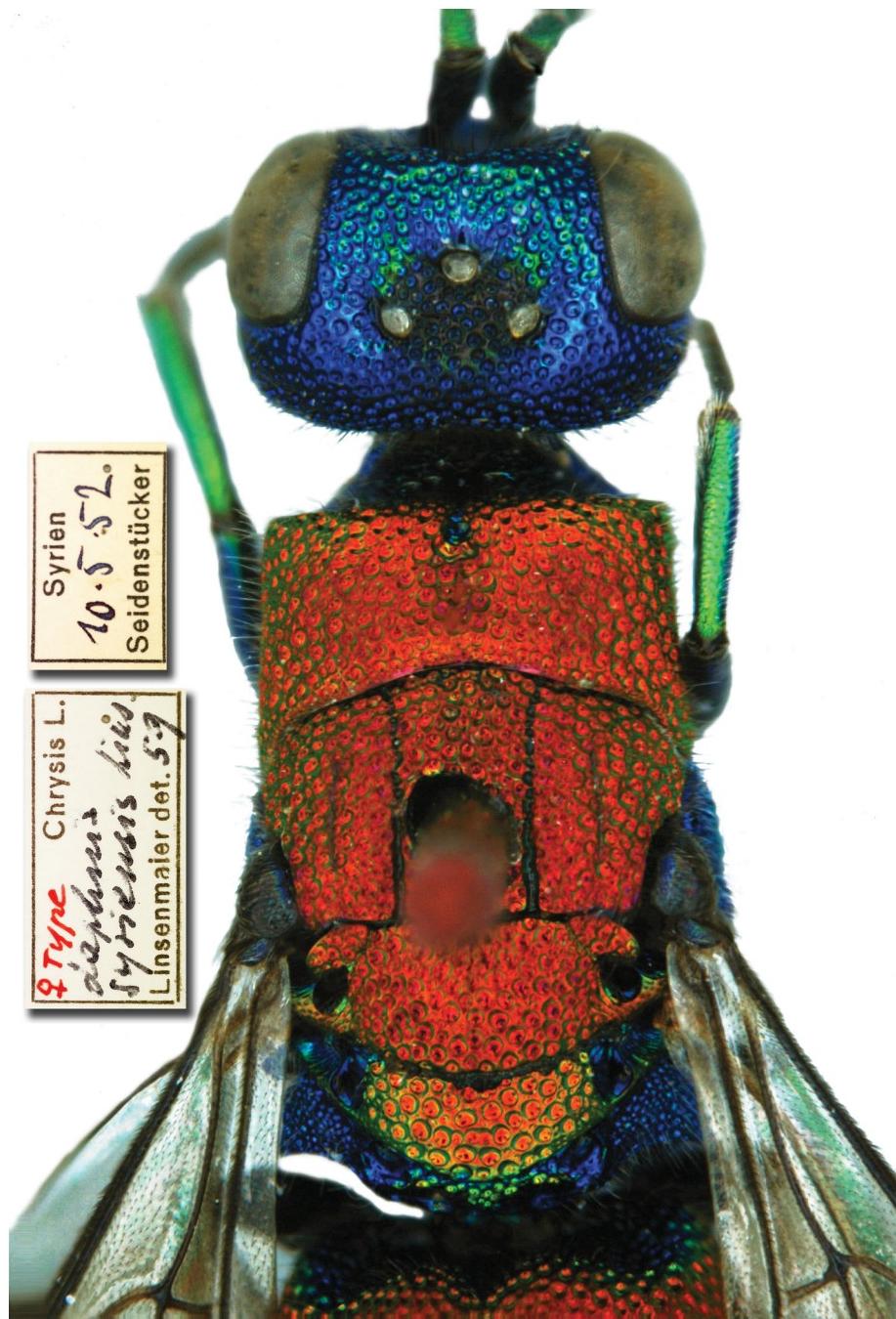


FIGURE 15. *Chrysis daphnis syriensis* Linsenmaier: pin cut and coloured at the top.

b) *Locality labels*

Linsenmaier transcribed a large number of original labels, rewriting those of other collectors as well as his own for specimens collected at the beginning of his career. Therefore, it is possible that some of the small, beige labels show the same locations as more recent, white, partially pre-printed labels (Fig. 16).

In his first publications (Linsenmaier 1951, 1959a, 1959b), for more than 50% of the new species described, Linsenmaier did not include detailed type locations. The only information he provided was the country (e.g. "Maroc", "Algeria", "Palästina", etc.). It wasn't until his later publications that he was forced to include all of the type locations, not only for the holotype, but also for the paratype series. In his first paper (Linsenmaier 1951), some of the type locations are not easily understood (e.g. "Mitteleuropa"). Furthermore, he removed the original type labels and rewrote the location labels. For this reason it is now impossible to ascertain the original type series. A complete list of the correct type locations will be included in a separate monograph on Linsenmaier's types.



FIGURE 16. Handwritten locality labels by Lisenmaier: **A)** original label handwritten in 1949; **B)** label probably rewritten in the 1980s.

In some cases Lisenmaier's interpretation of the localities (not only type localities) was not sufficiently accurate. For example, the type locality "Santa Catarina" refers to Nova Teutônia, near Seara, in the Northwestern part of the Santa Catarina State. All of the specimens collected by Fritz Plaumann on his property were found between 300m and 500m (coordinates written on the labels: $27^{\circ}11'$ – $52^{\circ}23'$). Therefore, Nova Teutônia is the correct type location for the following species: *Chrysis (Trichrysis) chrysifacialis*, *C. commilita*, *C. compensata*, *C. complementa*, *C. denticlypeata*, *C. hyalifoveolata*, *C. imminentia*, *C. meridionalis*, *C. plaumanni*, *C. scyphiphora*, *C. sericalineata*, *C. striatidorsa*, *Neochrysis aptata*, *N. prospinigera*.

In many cases political boundaries were not correctly reported. Thus, some locations are labelled as Italian instead of Croatian (e.g. Fiume) or Slovenian (e.g. Strugnano), or as French instead of Italian (e.g. Oulx). This is also true for many samples from Portugal (such as *Chrysis dives* ssp. *europaea* and *Hedychrum micans* ssp. *europaeum*), Russia (various localities in Ukraine or in the nation states of the Caucasus, generally listed as South Russia), and Central Europe (e.g. Német-Bogsán is given as Hungary instead of Romania), as well as from France, Germany, Austria, etc. This inaccurate information was published in Lisenmaier's papers. The corrected list will be published online via the GBIF website.

c) Identification labels

With few exceptions, identification labels are dated from 1959 onwards. Lisenmaier re-organized his private collection after the publication of his main revision (1959a) when he changed almost all of the identification labels. Unfortunately, he removed the original labels written in the previous years and did not re-label all the syntypes and paratypes of the taxa described in 1951 (see later); as a consequence, some syntypic specimens are now lost in the collection. Moreover, according to Lisenmaier, only the holotype and the allotype were of importance; therefore sometimes he did not consider the rest of the type series as significant and he did not always label all of the paratypes and syntypes (see below).

In many instances Lisenmaier labelled the types several years after writing the description. For example, types of *Chrysis (Cornuchrysis) eversmanni* ssp. *cyrenaicaensis* Lisenmaier, 1968 and *C. indigotea* ssp. *declarata* Lisenmaier, 1968 were labelled in 1973, while *C. sculptidiscalis* Lisenmaier, 1987 was labelled in 1991.

The pictures below (Figs. 15a, b, c) show three different examples of type labels for taxa described in 1951. The original old label, written in 1951, is that of *Chrysis ignita* L. var. *mediata* Lisenmaier (Fig. 17a); the type label for *Holopyga amoenula* var. *virideaurata* Lisenmaier was rewritten after 1959 (according to the new label) and the year of description (1951) is correct (Fig. 17b); the type label for *Chrysis germari* var. *lucida* Lisenmaier was rewritten in 1959 and has the wrong year of description (1959 instead of 1951) (Fig. 17c).

The new, white labels were introduced for the first time in 1957, but almost all of the identifications date back to 1959, when Lisenmaier re-organized his collection. New identification labels were printed at least twice: in 1957, which were used until 1968 (these are easily recognizable because the determiner is written as "Lisenmaier det."); and once again most likely in 1968, which were used until 2000 (for these the determiner is written "det. Lisenmaier").

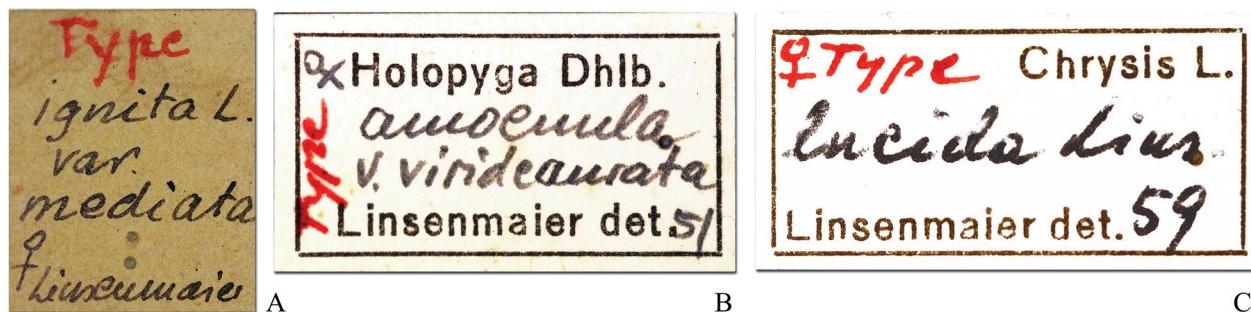


FIGURE 17. Type labels handwritten by Lisenmaier, based on specimens described in 1951: A) original label handwritten in 1951 (*C. ignita* var. *mediata* Lisenmaier, 1951); B) label rewritten probably in 1959 (*H. amoenula* var. *virideaurata* Lisenmaier, 1951); C) label rewritten in 1959 (original combination *C. germari* var. *lucida* Lisenmaier, 1951).

The coloured grey or light blue labels placed between the specimen and the locality label (Figs. 3-6) often include some general handwritten observations, such as, "Habitus, Cav [Cavitas], Pkt [Punktierung], Abd [Abdomen], Färbung, Analrand"; or more specific observations, such as "Abd. feiner p." [Abdomen feiner punktiert] and "AnR blau" [Analrand blau], "T2 feiner punktiert" [zweites Tergit feiner punktiert].

In few cases Lisenmaier left in his collection the old collection names and not the species names described. For example, Lisenmaier in 1977 labelled as *Hedychridium brevifaciale* Lisenmaier the holotype of *Hedychridium laeviclypeatum* described in 1999. Lisenmaier did not change the identification label and, as a result, the name *laeviclypeatum* is not present in his collection. The same is true for *Chrysis palliditegularis*, later described as *C. tegularis* Lisenmaier, 1999.

Type material

Not all of the primary types described by Lisenmaier are housed in his private collection. Many types are deposited in private or public collections, for example at the British Museum of Natural History in London, the Museo de Zoologia da Universidade in São Paulo, the Natural History Museum in San Francisco, etc. For the complete list of the primary types housed in the Lisenmaier collection see the APPENDIX A. The identification of the types described by Lisenmaier was particularly difficult and will certainly receive a degree of criticism. All identifications will be supported using the Code (International Commission on Zoological Nomenclature, fourth edition, 1999). During revision several cases came to light which will be discussed in a separate publication. This paper lists the following:

a) Taxa described in 1951

In his first publication, Lisenmaier described many new taxa without designating holotypes. In a few cases the description is based on a single specimen only, which is considered as holotype by monotypy (e.g. *Chrysis ignita* var. *deleta*, *Hedychridium reticulatum* var. *marteni*) and only in the following cases he designated a holotype and a paratype series: *Chrysis exsulans* var. *asiatica*; *C. germari* var. *lucida*; *C. ignita* var. *japanensis*; *Holopyga amoenula* var. *virideaurata*; *H. gloriosa* var. *calida*; *Stilbum calens* var. *enslini*; *S. chrysocephalum* var. *concolor*. In the other cases, the type specimens should be considered as syntypes (*Chrysis analis* var. *simplonica*; *C. cylindrica* var. *procerula*; *C. ignita* var. *aurifera*; *C. interjecta* var. *hemichlora*; *C. interjecta* var. *robusta*; *C. leachii* var. *cortii*; *C. leachii* var. *cypriana*; *C. germari* var. *fulminans*; *C. pyrophana* var. *orionea*; *C. rutilans* var. *rigiana*; *C. scutellaris* var. *marteni*; *C. spilota*; *Stilbum cyanurum* var. *pacifica*).

In the following years, Lisenmaier selected two specimens (one male and one female) of these syntype series to represent the holotype and the allotype, and put them in the type-collection. Lisenmaier (1959a) automatically designated the lectotype of these species by using the expression "the type" selecting a particular syntype to act as the unique name-bearing type of the taxon (Article 74.5 of the Code) (*C. ignita* var. *clarinicollis*; *C. ignita* var. *mediadentata*; *C. ignita* var. *mediata*; *C. ignita* var. *nipponica*; *C. ignita* var. *pseudobrevitarsis*; *C. longula* var.

sublongula) (Paukkunen *et al.* 2014). We consider the specimens described in 1951, found in the type-collection and labelled as "Type" in 1959 as the lectotypes.

Unfortunately, Linsenmaier did not label as "type", or with other clear indication, most of the type specimens included in the original series or, if he did, the indication was lost when Linsenmaier transcribed the original labels or reorganized his collection. It was, therefore, necessary to combine the localities and collection dates of every single specimen in order to reconstruct the original type series.

b) Allotypes

Linsenmaier, like other authors in the 1960s, often designated as allotype specimens which were not belonging to the original type-series, but which were later collected by him or by his colleagues. This happens, for example, in the cases of: *Chrysis circe* Mocsáry, 1889; *C. laetula* Semenov-Tian-Shanskij, 1954; *C. larochei* Linsenmaier, 1993; *C. mavromoustakisi* Trautmann, 1926; *C. sardarica* Radoszkowski, 1890; *Euchroeus (Prospinolia) theresae* (Buysson, 1900), *E. (Euchroeus) hellenicus* (Mocsáry, 1913); *E. binodatus* Edney, 1947; and *Praestochrysis janthina* (Smith, 1874).

Some of these "allotypes" without type status were published in his papers (Linsenmaier 1968, 1987, 1997b); e.g. *Chrysis idolon* Semenov, 1910; *Chrysis cuproprasinata* Mocsáry, 1913; and *Chrysis aurelia* Balthasar, 1953). Others refer to taxa described by Linsenmaier in previous papers: e.g. *Chrysis lucida* Linsenmaier, 1951, (allotype described in 1968); *C. wahrmanni* Linsenmaier, 1957 (described in 1968); *C. irreporta almeriana* Linsenmaier, 1959 (described in 1968); *C. canaria* Linsenmaier 1959 (described in 1968); *C. excursa* Linsenmaier, 1959 (described in 1968); *C. tunisiana* Linsenmaier, 1959 (described in 1968); and *C. atraclypeata* ssp. *nevadensis* Linsenmaier, 1987 (described in 1997a). Unfortunately, this practice has also been applied to specimens which he received from various museums. For example, in the The Swiss Federal Institute of Technology Zurich (ETH Zürich) there is the female "allotype" of *Chrysis propinquata* Mocsáry, 1889, labelled by Linsenmaier in 1962, and in the Cantonal Zoological Museum of Lausanne there is a male specimen of the *Chrysis rebecca* Morice, 1909 which is labelled as allotype by Linsenmaier in 1967: [Syrie / Krak Chevaliers / 1-V-1960] and [Tri – Chrysis L. [sic!] / rebecca / Morice / Linsenmaier det. 67 / Allotype]. This specimen was considered as a valid type by Mingo (1985), but it actually has no type status at all, since *C. rebecca* was described based on a single female specimen (holotype by monotypy) housed in the Hope Entomological Collections in Oxford (England).

c) Paratypes and cotypes

Not only Linsenmaier, but various other authors as well, got confused with paratypes. The collection includes specimens exchanged with Balthasar and Nikol'skaya which are labelled as types, but are not truly types (e.g. *Chrysis elvira* Balthasar, 1957, *C. fax* Semenov, 1902 and *Parnopes glasunowi* Semenov, 1901). After the labels were translated from Cyrillic it became clear that the specimens were collected after the description of the species had been published, while in the case of *P. glasunowi* the description includes only one specimen which is holotype by monotypy. Similar cases are related to old labels "cotype". For example, a female of *Chrysis cyanops* Mócsary, 1904 was collected at Willowmore, on the 20th of May 1904, and labelled by H. Brauns as cotype; the type series includes only specimens collected by H. Brauns on the 20th of April 1903, 7th of May 1903 and 25th of September 1903, therefore the specimen housed in the Linsemaier collection is not a syntype (currently paralectotype).

In some cases Linsenmaier labelled the holotype and the allotype, but not all of the paratypes belonging to the same taxon and stored in the same collection. The latter specimens were therefore considered as paratypes, in accordance with Art. 72.4.1.1 of the ICZN. For example, for *Hedychrum aureicolle* ssp. *niemelai* Linsenmaier (1959a) wrote: "Mir vorliegend aus Portugal, Spanien, Korsika, Frankreich, Italien und Sizilien, Schweiz, Deutschland, Holland, England, Fennoskandien, Polen, Österreich, Ungarn, Jugoslawien, Mandschurei. ♀ Type (Schweiz, Wallis) Coll. m., ♂ Allotype (Wallis) Coll. Verhoeff". All of the specimens identified in 1959 and collected at the localities listed by Linsenmaier are considered as paratypes, even if "paratype" is handwritten on few identification labels. An additional identification label has been pinned: "PARATYPE P. Rosa vidit 2010 GBIF Chrysidae".

In the case of *Holopyga ovata* ssp. *proviridis*, in the original description Linsenmaier (1959a) included one specimen from Siberia. Later Linsenmaier excluded this specimen from the type series and erased the handwritten "paratype" name. However, it maintained its type status. The specimen has been transferred by Linsenmaier under the name *H. amoenula occidenta* Linsenmaier.

Often Linsenmaier did not include some paratypes in the type-series given in the last publications. These specimens, labelled as paratypes in collections, may be considered as paratypes according to the ICBN, Art. 72.4.1.1: "For a nominal species or subspecies established before 2000, any evidence, published or unpublished, may be taken into account to determine what specimens constitute the type series" (e.g. *Chrysis palliditegularis*, *C. globiscutella*, and *C. hohmanni*). Linsenmaier labelled as "type" or "paratype" specimens which he received 20-30 years before their descriptions were written. This is clearly shown in his last work on the northern African species (Linsenmaier 1999). An example of such is found in *Chrysis curtula* Linsenmaier, 1999: the first specimens were labelled as types in 1977. As it was already explained in a previous chapter, the exact locations were not important to Linsenmaier, who, in the beginning (1959a), did not even include the complete type localities, but only the country of provenance (e.g. "Maroc"). When Linsenmaier (1999) was forced to record all information related to the type material and to the type series, he did not include all of the specimens examined. Most of the specimens which he examined from other collectors (e.g. Guseleinert, Schmidt, Schwarz, Warncke, etc.) and which were collected in the last 20 years were sent back to their owners without him having taken note of the exact localities written on the labels. Linsenmaier noted only the country. In this case many specimens labelled as paratypes were not included in the type series and therefore were not included in the type material of other museums (e.g. Biologiezentrum Linz, F. Guseleinert in litteris).

d) "Lost" types, series and locality labels

Linsenmaier glued two typical specimens (e.g. holotype and paratype of *Holopyga punctatissima* ssp. *reducta* Linsenmaier, 1959a) onto the same label. In this case Linsenmaier did not indicate which of the two specimens was the "type", and thus the type was to be considered lost, as the true type was impossible to ascertain. In all the other cases when more types (holo-, allo- and paratypes) are glued together (see the picture of *Hedychrum aureicolle niemelai* Linsenmaier, 1959 in Rosa *et al.* 2014), Linsenmaier wrote on the back of the identification label some notes: [e.g. "type oben links", etc.]

In many instances Linsenmaier removed the original type label, which means that the type series is now lost. This is the case for many taxa described in 1951, and for almost all of the taxa which he himself later recognized as synonyms (e.g. *Chrysis ehrenbergi chrysodorsa* Linsenmaier, 1968). For *Chrysis chrysocandens*, the holotype itself is missing. Linsenmaier put the label "*chrysocandens = urfana* 303 [number of the type in Linsenmaier's type-collection]" in the type collection, and removed the type. The type was not found in any other collection. Also for *Chrysis ignita* ssp. *schenckiana* (currently *C. schencki*), Linsenmaier removed all of the type labels except for holotype and allotype. In 1968 Linsenmaier thoroughly revised the *Chrysis ignita* group. He changed the interpretations of various taxa and removed all of his original labels. As a result, the complete type series for *C. schenckiana* was lost because all of the possible paratypes are now divided under different species and there is no indication of how Linsenmaier identified them in 1959.

In the case of *Chrysis cohaerea* ssp. *pseudogribodoi*, Linsenmaier glued the holotype and the allotype onto the same label. The labels of these two specimens are pinned under the transparent label, but were left unmarked by Linsenmaier. As a result, it is now impossible to combine the specimens according to their appropriate locality label.

e) *lapsus calami*: dates, localities and identification of sexes

In many instances, there are what should probably be considered as *lapsus calami*, for both collection dates and localities.

For example, in the case of *Hedychridium verhoeffi* ssp. *yermasoyense*, Linsenmaier wrote a different date from that which is pinned to the type specimen (August 5, 1957 rather than September 1, 1957). In other instances, the month of collection (i.e. *Hedychridium inusitatum*, *Chrysis foveatidorsa*) or the year of collection (i.e. *Chrysis retracta*, *C. heraklionica*, *Cleptes moczari*) are wrong.

In the case of *Chrysis globiscutella*, Linsenmaier listed "Tunesien. ♂ Type [holotype] und ♀ Allotype Matmata, 11.IV.1994 M. Schwarz, Coll. m.; Paratypen Matmata, 15.IV.1994, Tataouine (56 km S) 11.IV.1994, Gabes, 17.IV.1981 leg. u. Coll. M. Schwarz, und Coll. m" whereas in collection the holotype and the allotype have different localities, but the same data: Tunesien, 56 km S Tataouine, 11.IV.1994, leg. M. Schwarz. On the other hand, there are two paratypes from Matmata (15.IV.1994) and Tataouine (11.IV.1994). It is probable that in this case the correct

locality of the holotype is truly Tataouine and not Matmata. For *Holopyga bifigurata* the given type locality is Tel Aviv. But the holotype and the allotype were collected in Abu Kabir [in the Tel Aviv municipality], and there are no paratypes from Tel Aviv. Therefore, Abu Kabir should be regarded as the correct location, but not Tel Aviv. For *Chrysis praecipua*, the allotype described is from Mut, but all of the specimens, including that labelled as allotype, are from Urfa.

In the case of *Holopyga mlokosiewitzi* ssp. *hemisimpla*, Linsenmaier included three specimens in the type-series “♂ Type, ♀ Allotype (*Konia und Eregli, VII.1952, leg. Seidenstücke*) und ♂ Paratype Coll. m.” The specimen cited as holotype is currently labelled as paratype. The specimen labelled as type [holotype] in the type collection was collected in 1958 and is most likely the specimen which was confused with the real holotype. The specimen labelled as allotype was collected in Ankara in 1960 and does not belong in the type series. It is thought that the specimen currently labelled as paratype should be considered as holotype. Other such cases were also discovered and will be discussed in the future.

In some cases, it turned out that the holotype was been described on the opposite sex (e.g. *Omalus (Omalus) perraudini*, *O. (Philoctetes) tenerifensis*, *Hedychridium hybridum*). In all these cases we prefer to consider as holotype the specimen labelled by Linsenmaier, not considering the wrong information given in the description.

f) Specimens without type status

Many specimens have been labelled as types by Linsenmaier, but for different reason they cannot be considered as types, according to the rules of ICZN. Here some cases:

Linsenmaier (1959a) gave the "new name" *Hedychridium lampadum*, which was an unnecessary replacement name, for *Hedychridium lampas* (Christ, 1791). After Kimsey & Bohart's (1991) publication, in 1997a Linsenmaier wrote that he had mistakenly published the species as a new name ("nom. n.") instead of "new species". He then labelled two specimens in his collection as type and allotype of *Hedychridium lampadum*. These specimens (considered as valid types by Arens 2010) cannot be considered as types for two reasons: 1) the name *lampadum* is a replacement name; the only type is the one described by Christ (currently considered lost); 2) a holotype designation assigned 40 year after the description is not valid. After realizing his mistake, Linsenmaier should have described a new species with a new name.

In the case of *Chrysis demaculata* Arens, 2004b and *Hedychridium viridiscutellare* Arens, 2004b, there are two *holotypes* and two *allotypes* for each taxon. During his research on the Turkish Fauna, Linsenmaier selected the holotype and the allotype for both species, but never published these names. Arens (2004b), who later described the two species, was not able to find the holotypes and allotypes selected by Linsenmaier and he designated a new holotype and a new allotype for each species and deposited them in the collection. The two holotypes originally selected by Linsenmaier have been later found in the collection and currently have no type status as they are not included in the original description given by Arens, even if they still bear the handwritten holotype labels by Linsenmaier.

Linsenmaier was used to pin type labels under specimens many years before the description of the species. Nowadays, in the Natur-Museum Luzern as well as in different museums in the US (San Francisco), Brazil (Sao Paulo and Belem), South Africa (Grahamstown and Pretoria), Europe (e.g. Budapest, Leiden, Linz, London, Lucerne, Munich, Zurich, etc.), and in private collections (e.g. Agnoli, Koschwitz, Niehuis, Rosa, Schmid-Egger), there are dozens of specimens labelled as "type", whose descriptions were never published. These species must be considered as *nomina in collection* and the specimens have no type status even if they were identified as types by Linsenmaier in the 1960s and 1970s. In the Linsenmaier collection there are more than 250 specimens labelled as types, but never published. However, in several cases (e.g. Schmid 1977), some of these names were published and became *nomina nuda*, having been published without any description. Most of these "types" are related to the revision of the Turkish and Sub-Saharan fauna, but chrysids from Africa and Asia were labelled by Linsenmaier as well. Since in many collections there are specimens labelled as type, which were never described, we provide the list of the species described by Linsenmaier in APPENDIX A.

g) Other cases

Many other cases difficult to evaluate were discovered in the collection. Each one must be considered individually according to the Code. The four most complex cases are listed and described below.

Chrysis (Chrysis) brevicollis Linsenmaier, 1987

Linsenmaier (1987: 152) described *Chrysis (Chrysis) brevicollis* based on a series of specimens collected at Yaiza, Lanzarote by Perraudin. *Chrysis brevicollis* Linsenmaier, 1987 is the primary homonym of *Chrysis (Hexachrysis) brevicollis* Mocsáry, 1899, a species described from Queensland, Australia. Bohart (in Kimsey & Bohart 1991: 380) synonymized *C. brevicollis* Mocsáry, 1899 with *C. agilis* Smith, 1874, without any diagnosis or information. Since the *C. brevicollis* is a primary homonym, both species belong to the genus *Chrysis* and the synonym proposed by Bohart should be confirmed, the replacement name *Chrysis vulcanica* Rosa, **nom. nov.** is proposed for *C. brevicollis* Linsenmaier, 1987. The name is given after the volcanic activity of the type locality, close to the Timanfaya volcano, in the UNESCO Biosphere reserve, which protects the delicate flora and fauna of the area.

Chrysis (Chrysis) sinensis tsunekii Linsenmaier, 1959a

Hundreds of specimens were collected in the same place and in the same time period (Tokyo, Mt. Takao, IV.-V.1959 by Tsuneki), but only a few of them were labelled as paratypes by Linsenmaier in 1959. The rest of the series was labelled in 1963 and 1988. It is unclear if these specimens were known at the time of the original description (1959) or if they were received later. They have been excluded from the type series.

Hedychridium maculiventre Linsenmaier, 1959b

Linsenmaier (in 1959a: 63) replaced the name *H. palestinense* Balthasar, 1953 with *H. maculiventre* Linsenmaier, 1959a and listed two localities: "Palästina and Jugoslawien". On the same page he described the subspecies *H. maculiventre sculpturatissimum* Linsenmaier, 1959a based on a type series of specimens collected in Cyprus. Later Linsenmaier (1959b: 235) wrote that he had confused the two taxa and described *H. maculiventre* as a new species, with a holotype from Jugoslavia (currently Croatia: Dalmatia, Omis, VIII.1952) and gave *H. sculpturatissimum* as the replacement name for *H. palestinense* Balthasar, 1953. It is a rather confusing situation and many authors, from Kimsey & Bohart (1991) to Arens (2010), have not described it correctly.

a) *maculiventre* Linsenmaier, 1959a is an unnecessary replacement name for *palestinense* Balthasar. Therefore *palestinense* Balthasar, 1953 is the valid name for the specimens found in Palestine;

b) *sculpturatissimum* Linsenmaier, 1959b is a junior homonym of *sculpturatissimum* Linsenmaier, 1959a and is an unnecessary replacement name for *palestinense* Balthasar, 1953;

c) *maculiventre* Linsenmaier, 1959b (described as a new species, with type series) should be considered as a junior homonym of *maculiventre* Linsenmaier, 1959a;

d) according to Linsenmaier (1959a and 1959b) only two names from this group are valid for the two taxa: *H. maculiventre* Linsenmaier, 1959b and *H. sculpturatissimum* Linsenmaier, 1959b. Linsenmaier (1997a: 258) recognized that the name *H. palestinense* Balthasar, 1953 was a valid name, as suggested by Kimsey & Bohart (1991: 200), but he did not realize that if so, the names *H. maculiventre* Linsenmaier, 1959a and *H. sculpturatissimum* Linsenmaier, 1959b were unnecessary replacement names. On the same page he considered three names (*H. maculiventre* Linsenmaier, 1959b; *H. sculpturatissimum* Linsenmaier, 1959b; and *H. palestinense* Balthasar, 1953) to be valid names. If this interpretation is correct, then, according to Linsenmaier, a third taxon is incorrectly named.

e) Arens (2010: 407) used Linsenmaier's last interpretation (1997a) and considered *H. palestinense* and the other two names valid.

f) After a written exchange, Arens and P. R. agreed that the third species needed a new name. Arens (2011: 316) renamed the species from Jugoslavia (now Croatia) as *H. maculisternum* Arens 2011. The final synonymic list of these species is:

- 1) *H. palestinense* Balthasar, 1953 (taxon from Palestine)
maculiventre Linsenmaier, 1959a: unnec. repl. name for *palestinense* Balthasar, 1953
sculpturatissimum Linsenmaier, 1959b: unnec. repl. name for *palestinense* Balthasar, 1953
nec sculpturatissimum Linsenmaier, 1959a
- 2) *H. sculpturatissimum* Linsenmaier, 1959a (taxon from Cyprus)
- 3) *H. maculisternum* Arens, 2011 (taxon from Croatia)
maculiventre Linsenmaier, 1959b, *nec maculiventre* Linsenmaier, 1959a

Hedychrum scutellare Linsenmaier, 1969

Linsenmaier (1969: 373) described *Hedychrum scutellare* Linsenmaier, 1969 as a new species from Palestine. This name is a junior primary homonym of *Hedychrum scutellare* Tournier, 1878 (currently *Hedychridium scutellare*). Nobody had ever heard before of this homonym because all the most important authors, from Kimsey & Bohart (1991: 204) to Linsenmaier (1959a), had erroneously considered *H. scutellare* Tournier as it had been described in the genus *Hedychridium*. At the time of *H. scutellare* Tournier's description, the *Hedychridium* genus had not yet been described. Abeille de Perrin (1878) published the description just a few months later in the same year. Currently, the two species are no longer congeneric and, as far as we know, after 1899 *H. scutellare* Tournier was no longer included in the *Hedychrum* genus.

The name *H. scutellare* Linsenmaier was cited as a valid name only in Schmidt (1977: 102), Kimsey & Bohart (1991: 220), and Strumia & Yildirim (2009: 83). According to the Article 23.9.5 (“*when an author discovers that a species-group name in use is a junior primary homonym [Art. 53.3] of another species-group name also in use, but the names apply to taxa not considered congeneric after 1899, the author must not automatically replace the junior homonym; the case should be referred to the Commission for a ruling under the plenary power and meanwhile prevailing usage of both names is to be maintained [Art. 82]*””) the name *H. scutellare* Linsenmaier, 1969 remains and the case will be referred to the Commission. If a replacement name is needed, the name *Hedychrum linsenmaieri* has been suggested in honour of his ground-breaking work.

Authorships

Linsenmaier must be considered as the author of some species previously incorrectly described (unavailable names) by Mader. For example:

- a) Linsenmaier (1951: 90) treated the invalid name *Stilbum cyanurum* ab. *subcalens* Mader, 1933 as variety of *S. calens*, and later as subspecies (1959a: 181) and thus made this name available as species-group name (ICZN 1999, Article 45.6.3). As Linsenmaier was the first author to make the name available, he should be considered as the author of *S. subcalens* (ICZN 1999, article 50.3.1).
- b) The same happens for the unavailable name *Chrysis leachi* (!) a. *auriceps* Mader, 1936 (ICZN 1999: Article 45.5), as noticed by the colleague Michael Madl (pers. comm.). Linsenmaier (1959a: 119) treated this name as a valid species, and thus made the name available as a species-group name (ICZN 1999: Article 45.6.3). Two female syntypes are housed in Vienna and Luzern, and we here designate the female specimen in the Linsenmaier collection as the lectotype, to fix the current interpretation of the species. It bears the labels “Insel Krk Cro., Mader” <printed> // “f. *auriceps* m. Typus” <handwritten by Mader> // *Chrysis auriceps* Mader det. Linsenmaier 59 // NML_ENT GBIF_Chro0022555
- c) Kimsey & Bohart (1991: 478) considered Linsenmaier as the author of *Chrysis westerlundi*, originally described as *Chrysis succincta* a. *westerlundi* Hellén, 1919, unavailable name (ICZN 1999: Article 45.5). However, the authorship must be attributed to Trautmann (1927: 159), who firstly considered *westerlundi* as a valid variety of *C. succincta*; later Balthasar (1953: 289) and Linsenmaier (1959a: 113) used the name *westerlundi* as a valid name in the species-group names, but the authorship goes to the first author: Trautmann (1927).

New synonyms

Linsenmaier discovered that some of species or subspecies described during his career were junior synonyms of other species. For various reasons he never published these synonymies. Below is a list of these new synonyms (valid name is second) accompanied by notes regarding types.

1) *Hedychridium hybridum* Linsenmaier, 1959 = *Hedychridium elegantulum* du Buysson, 1887, syn. nov.

Remarks. The type is a male, not a female and the type location is not Fréjus, but rather Saint-Aygulf, a location near to Fréjus. In the type collection, Linsenmaier removed the number-type label attached to the holotypes and identified it as *H. elegantulum* Buysson.

2) *Hedychridium insequosum* Linsenmaier, 1959 = *Hedychridium perpunctatum* Balthasar, 1953, syn. nov.

Remarks. Linsenmaier never published the new synonym *H. insequosum* Linsenmaier = *H. perpunctatum* Balthasar, 1953. He most likely recognized the synonym after the examination of a paratype of *H. perpunctatum* now housed in his collection.

3) *Euchroeus (Pseudospinolia) humboldti jerichoensis* Linsenmaier, 1959 = *Euchroeus (Pseudospinolia) incrassatus* (Spinola, 1838), syn. nov.

Remarks. Linsenmaier moved the holotype of *E. jerichoensis* from the type collection to the general collection. He removed the number-type label and identified it as *E. incrassatus* (Spinola).

4) *Chrysis pyrophana* var. *orionea* Linsenmaier, 1951 = *Chrysis pyrophana* Dahlbom, 1854, syn. nov.

Remarks. Linsenmaier considered the specimens housed in his type collection as holotype and allotype, but they are syntypes. Linsenmaier (1959a) labelled the types as synonym of *C. pyrophana* Dahlbom, 1854; however, he wrote (1959a: 110) "Meine var. *orionea* 1951, grosse Individuen aus Spanien, ist kaum genügend isoliert als Subspezies". He later removed the number-type label and considered *C. orionea* as a synonym.

5) *Chrysis consanguinea iberica* Linsenmaier, 1959 = *Chrysis consanguinea* Mocsáry, 1889, syn. nov.

Remarks. Linsenmaier (1997a: 277) considered *iberica* to be a possible synonym of *consanguinea*, but added, "Punktierung der Abdomen in N. Afrika in der Regel etwas feiner und weniger dicht. Mocsáry beschrieb *Chr. consanguinea* von Sizilien und Algerien, weshalb ich ssp. *iberica* Lins., bis auf weiteres nicht weiterführe". In his collection all of the type specimens of *C. iberica* were labelled as *C. consanguinea* Mocs. The holotype and allotype were left in the type collection, but he removed the number-type label.

Conclusions

As already mentioned, the Linsenmaier Collection housed in the Natur-Museum Luzern is (and remains) undoubtedly one of the most noteworthy Chrysidae collections in the world and Walter Linsenmaier was definitely one of the major authors studying this family of wasps. We hope that the present paper will contribute to a better understanding of the precious work performed by Linsenmaier and that the revisional study of the types done in his collection during the GBIF program will make the work of all the interested taxonomists easier.

We suggest that the Linsenmaier collection becomes the main collection reference for the European entomologist, and a centre of chrysidid taxonomy, analogously to Linz, a recognized centre for the Apoidea. In the last years, the collection was visited for long periods by many researchers (e.g., P. Rosa, V. Soon and N.B. Vinokurov) and the types studied by different authors (e.g. W. Arens, L. Móczár, J. Paukkunen, V. Soon, F. Strumia and N.B. Vinokurov). This collection would be the appropriate place for depositing type material (Arens 2001, 2002, 2004a, 2004b, 2010a, 2010b, 2011, 2014; Móczár 2000; Niehuis 2000; Reder & Arens 2012; Rosa 2003, 2004; Strumia 2003, 2012) and designating neotypes (Rosa & Xu 2015; Rosa & Vårdal, 2015). Moreover, the large number of specimens preserved in this collection, from 150 countries, represent a fundamental resource for studying distributional data in the Palaearctic Region (Baldock 2014; Paukkunen *et al.* 2014; Rosa & Soon 2012; Rosa & Zettel 2011; Rosa *et al.* 2013; Strumia 2012; Vinokurov 2012) and even in other zoogeographical Regions (i.e. Afrotropical (Madl & Rosa 2012) and Oriental (Rosa *et al.* 2014)).

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APPENDIX A

Species-group names described by Walter Linsenmaier

Linsenmaier, having described 720 taxa in sixteen articles (including subgeneric, specific, subspecific and infrasubspecific names), was the most prolific author in the history of the Chrysididae family. Linsenmaier also provided thirty replacement names (28 to species and subspecies, two to subgenera), of which twelve resulted unnecessary. All the species-group names (definition of the Code) described by Linsenmaier are herein listed in alphabetical order so as to facilitate any further research on his type material in private and public collections. The types housed in the Linsenmaier collection in the Natur-Museum Luzern are also reported with their status (HT = holotype, AT = allotype, LT = lectotype, PLT = paralectotype, PT = paratype, ST = syntype; doubtful types are given in square brackets = [n PT] or [n ST]).

- abdominata* Linsenmaier, 1959a: 127. (*Chrysis (Chrysis)*) HT, AT
acclinata Linsenmaier, 1985: 458. (*Neochrysis (Neochrysis)*) HT, AT
adelaidanus Linsenmaier, 1982: 328. (*Euchroeus (Primeuchroeus)*) HT, AT, 19 PT
adipata Linsenmaier, 1997a: 281. (*Chrysis (Chrysis)*)
adnexa Linsenmaier, 1999: 200. (*Chrysis (Chrysis)*) HT

- adnexa* Linsenmaier, 1997a: 265. (*Neochrysis (Exsecochrysis)*)
aemula Linsenmaier, 1985: 477. (*Neochrysis (Ipsiura)*) HT, AT, 5 PT
aeneibasalis Linsenmaier, 1987: 149. (*Chrysis (Chrysis) germari* ssp.) HT, 1 PT
aeneiventris Linsenmaier, 1994a: 177. (*Chrysis (Chrysis)*) 1 PT
aeneopaca Linsenmaier, 1959a: 160. (*Chrysis (Chrysis) longula* ssp.) HT, AT, 24 PT
aenigma Linsenmaier, 1994a: 172. (*Chrysis (Chrysis)*)
aequabilitum Linsenmaier, 1994a: 162. (*Hedychridium (Hedychridium)*)
affinita Linsenmaier, 1959a: 109. (*Chrysis (Chrysis) grohmanni* ssp.) HT, AT, 4 PT
affulgens Linsenmaier, 1994c: 515. (*Cleptes*) HT, AT
afghanica Linsenmaier, 1968: 68. (*Chrysis (Chrysis)*) [type based on the type of *Chrysis succinctula komareki* var. *udalrichi* Balthasar, 1957 quadrimomial, unavailable] HT
agadiensis Linsenmaier, 1959a: 84, nec Burysson, 1911 (*Chrysis (Chrysogona) oraniensis* ssp.)
agadiricola Linsenmaier, 1999: 200. (*Chrysis (Chrysis)*) HT, AT, 4 PT
agitata Linsenmaier, 1959a: 138. (*Chrysis (Chrysis) angustifrons* ssp.) HT
agnata Linsenmaier, 1997a: 267. (*Neochrysis (Ipsiura) aemula* ssp.) HT, AT, 1 PT
albofacies Linsenmaier, 1985: 452. (*Neochrysis (Neochrysis)*) HT
alces Linsenmaier, 1968: 52. (*Chrysis (Papuachrysis)*) 8 PT
alia Linsenmaier, 1959a: 114. (*Chrysis (Chrysis) albanica* ssp.) HT, AT, 1 PT
alienigena Linsenmaier, 1999: 140. (*Chrysis (Chrysis) subsimilata* ssp.) HT, 2 PT
aliquanta Linsenmaier, 1959a: 83. (*Chrysis (Chrysogona) oraniensis* ssp.) HT
aliunda Linsenmaier, 1959b: 239. (*Chrysis (Chrysis) marginata* ssp.) HT, AT, 2 PT
allabora Linsenmaier, 1968: 88. (*Chrysis (Chrysis)*) HT
allegata Linsenmaier, 1968: 49. (*Chrysis (Chrysogona) lydiae* ssp.) HT, AT, 33 PT
allotria Linsenmaier, 1985: 463. (*Neochrysis (Exsecochrysis)*) HT
almeriana Linsenmaier, 1959a: 112. (*Chrysis (Chrysis) irreverpa* ssp.) HT
amaurotica Linsenmaier, 1993: 726. (*Chrysis (Chrysis) canaria* ssp.) 2 PT
amaurotica Linsenmaier, 1985: 470. (*Neochrysis (Ipsiura)*) HT
ambiguus Linsenmaier, 1982: 329. (*Euchroeus (Primeuchroeus)*) HT
ampliata Linsenmaier, 1968: 54. (*Chrysis (Chrysis) simplex* ssp.) HT, AT, 10 PT
amplifera Linsenmaier, 1994a: 192. (*Chrysis (Praestochrysis)*)
andradei Linsenmaier, 1959a: 105. (*Chrysis (Chrysis)*) HT
anguifera Linsenmaier, 1984: 215. (*Chrysis (Trichrysis)*) HT, 1 PT
angulimacula Linsenmaier, 1985: 442. (*Neochrysis (Neochrysis) charruana* ssp.) HT
angustanalis Linsenmaier, 1994b: 491. (*Chrysis (Chrysis)*) HT, 1 PT
angustidentis Linsenmaier, 1999: 207. (*Chrysis (Chrysis)*) HT
angustiradialis Linsenmaier, 1984: 212. (*Chrysis (Trichrysis)*)
antakyensis Linsenmaier, 1968: 67. (*Chrysis (Chrysis)*) HT
antakyensis Linsenmaier, 1968: 7. (*Cleptes*) HT, AT, 2 PT
antiatlasia Linsenmaier, 1999: 176. (*Chrysis (Chrysis)*)
antiochicola Linsenmaier, 1994b: 486. (*Chrysis (Chrysis)*) HT
appliata Linsenmaier, 1959a: 32. (*Holopyga chrysonota* ssp.) HT, 3 PT
apposita Linsenmaier, 1984: 210. (*Chrysis (Trichrysis)*) HT, AT, 37 PT
aptata Linsenmaier, 1984: 212. (*Chrysis (Trichrysis)*) HT, AT, 19 PT
aptus Linsenmaier, 1982: 327. (*Euchroeus (Primeuchroeus)*) HT, AT
apuda Linsenmaier, 1984: 213. (*Chrysis (Trichrysis)*)
arabica Linsenmaier, 1994a: 155. (*Holopyga*) HT, AT, 12 PT
arabicus Linsenmaier, 1994a: 167. (*Euchroeus (Euchroea) euos* ssp.)
ascoensis Linsenmaier, 1987: 149. (*Chrysis (Chrysis) pulcherrima* ssp.) HT, AT, 6 PT
asiatum Linsenmaier, 1997a: 254. (*Hedychridium (Hedychridium) integrum* ssp.) 2 PT
asiatica Linsenmaier, 1951: 82. (*Chrysis (Chrysis) fulgida* var.) 1 PT
asperifacies Linsenmaier, 1999: 248. (*Chrysis (Cornuchrysis)*) HT
assecia Linsenmaier, 1999: 154. (*Chrysis (Chrysis)*) HT
assecia Linsenmaier, 1997a: 268. (*Neochrysis (Ipsiura)*) HT
assecula Linsenmaier, 1999: 39. (*Holopyga (Holopyga)*) HT
atlantea Linsenmaier, 1968: 100. (*Chrysis (Chrysis) longula* ssp.) HT, 4 PT
atlasia Linsenmaier, 1987: 146. (*Chrysis (Chrysogona) varidens* ssp.) HT, AT, 25 PT
atraclypeata Linsenmaier, 1968: 89. (*Chrysis (Chrysis)*) HT
atratum Linsenmaier, 1968: 129. (*Hedychridium (Hedychridium)*) HT
atriventris Linsenmaier, 1968: 57. (*Chrysis (Chrysis)*) HT
atrocomitata Linsenmaier, 1993: 726. (*Chrysis (Chrysis)*) 4 PT
auriceps Linsenmaier, 1959a: 119. (*Chrysis (Chrysis)*) LT

- aurifera* Linsenmaier, 1951: 76. (*Chrysis (Chrysis) ignita* var.) 2 ST [32 ST]
aurimaculifrons Linsenmaier, 1968: 133. (*Chrysis (Chrysis)*) HT, AT
aurinotata Linsenmaier, 1968: 82. (*Chrysis (Chrysis) pyrrhina* ssp.) HT, AT, 15 PT
austeramedia Linsenmaier, 1987: 151. (*Chrysis (Chrysis) castillana* ssp.) HT, 2 PT
austeritata Linsenmaier, 1984: 212. (*Chrysis (Trichrysis)*) HT
austeritatum Linsenmaier, 1997a: 258. (*Hedychridium (Hedychridium) lampadum* ssp.) HT, AT, 5 PT
austrialis Linsenmaier, 1959a: 32. (*Holopyga*) HT, 3 PT
azrouensis Linsenmaier, 1987: 150. (*Chrysis (Chrysis) elegans* ssp.) HT, AT, 2 PT
baezi Linsenmaier, 1993: 728. (*Chrysis (Chrysis) anomala* ssp.)
balearica Linsenmaier, 1968: 66. (*Chrysis (Chrysis)*) HT
barbatula Linsenmaier, 1968: 131. (*Chrysis (Chrysogona)*) HT, 1 PT
batyamensis Linsenmaier, 1969: 376. (*Chrysis (Chrysis)*) HT
beershebense Linsenmaier, 1969: 372. (*Hedychrum*) HT [given as *H. beershebensis* at pag. 350]
benghasiensis Linsenmaier, 1968: 73. (*Chrysis (Chrysis)*) HT
berberiacum Linsenmaier, 1959a: 59. (*Hedychridium chloropygum* ssp.) HT, AT, 2 PT
berberiana Linsenmaier, 1959a: 154. (*Chrysis (Chrysis) mediata* ssp.) HT, AT, 7 PT
berlandi Linsenmaier, 1959a: 139. (*Chrysis (Chrysis)*) HT, AT, 2 PT
betscharti Linsenmaier, 1997a: 264. (*Neochrysis (Neochrysis)*) HT, 1 PT
bicarinatus Linsenmaier, 1959a: 69. (*Euchroeus (Spinolia) dallatorreanus* ssp.) HT, AT, 2 PT
bifigurata Linsenmaier, 1968: 18. (*Holopyga*) HT, AT, 10 PT
bifossata Linsenmaier, 1985: 452. (*Neochrysis (Neochrysis)*) HT
bilobipleuris Linsenmaier, 1982: 339. (*Chrysis (Chrysis)*) HT
birecikensis Linsenmaier, 1968: 132. (*Chrysis (Chrysis)*) HT
bischoffi Linsenmaier, 1959a: 157. (*Chrysis (Chrysis) ignita* ssp.) HT, AT, 58 PT
biskrana Linsenmaier, 1959a: 28. (*Holopyga*) HT, AT
biskranum Linsenmaier, 1999: 85. (*Hedychridium (Hedychridium)*) HT
bispeculiferum Linsenmaier, 1997a: 256. (*Hedychridium (Hedychridium)*)
bluethgeni Linsenmaier, 1959a: 102. (*Chrysis (Chrysis)*) HT
borneense Linsenmaier, 1959a: 181. (*Stilbum cyanurum* ssp.) HT, 1 PT
brevicarinata Linsenmaier, 1999: 115. (*Chrysis (Chrysogona)*) 1 PT
brevicollaris Linsenmaier, 1999: 197. (*Chrysis (Chrysis)*) HT, AT, 3 PT [1 PT]
brevicollis Linsenmaier, 1987: 152. (*Chrysis (Chrysis)*) HT, AT, 11 PT [1 PT]
brevifronte Linsenmaier, 1968: 30. (*Hedychridium (Hedychridium)*) HT
brevimarginata Linsenmaier, 1959a: 153. (*Chrysis (Chrysis) ruddi* ssp.) HT, AT, 7 PT
breviradialis Linsenmaier, 1968: 100. (*Chrysis (Chrysis)*) HT, AT, 16 PT
buettikeri Linsenmaier, 1994a: 188. (*Chrysis (Chrysis)*) HT, 1 PT
bulgariensis Linsenmaier, 1959a: 19. (*Omalus (Omalus) pusillus* ssp.) 2 PT
burgenlandia Linsenmaier, 1968: 50. (*Chrysis (Chrysogona) phryne* ssp.) HT, AT, 2 PT
bytinskii Linsenmaier, 1959a: 126. (*Chrysis (Chrysis)*) HT
bytinskii Linsenmaier, 1969: 374. (*Euchroeus (Euchroeus) moricei* ssp.) HT
bytinskii Linsenmaier, 1959a: 53. (*Hedychridium*) HT
bytinskii Linsenmaier, 1959a: 38. (*Hedychrum luculentum* ssp.) HT, AT
caireana Linsenmaier, 1999: 37. (*Holopyga (Holopyga)*) HT, PT
caireanum Linsenmaier, 1968: 33. (*Hedychridium (Hedychridium)*) [lost?]
calida Linsenmaier, 1951: 15. (*Holopyga gloriosa* var.) 5 ST
canaria Linsenmaier, 1959a: 117. (*Chrysis (Chrysis)*) AT, 2 PT
canariense Linsenmaier, 1968: 29. (*Hedychridium (Hedychridium)*) 1 PT
cardiofera Linsenmaier, 1985: 474. (*Neochrysis (Ipsiura)*) HT
caspicensis Linsenmaier, 1959a: 113. (*Chrysis (Chrysis) helleni* ssp.) HT, AT, 1 PT
cassidifacies Linsenmaier, 1999: 146. (*Chrysis (Chrysis)*) HT, AT
catarinensis Linsenmaier, 1985: 441. (*Neochrysis (Neochrysis)*) HT
caucasiana Linsenmaier, 1987: 155. (*Chrysis (Cornuchrysis) sacra* ssp.)
caudex Linsenmaier, 1968: 76. (*Chrysis (Chrysis)*) HT
cavernosa Linsenmaier, 1994a: 178. (*Chrysis (Chrysis)*)
cavifacies Linsenmaier, 1999: 134. (*Chrysis (Chrysis)*) HT, AT, 1 PT
cedarsensis Linsenmaier, 1968: 114. (*Chrysis (Cornuchrysis)*) HT
centropunctata Linsenmaier, 1968: 66, 133. (*Chrysis (Chrysis)*) HT, AT
chiosensis Linsenmaier, 1997a: 274. (*Chrysis (Chrysis) frivaldskyi* ssp.) HT, AT, 2 PT
chrysocandens Linsenmaier, 1969: 375. (*Chrysis (Chrysis)*) [lost?]
chrysodorsa Linsenmaier, 1968: 106. (*Chrysis (Platycelia) ehrenbergi* ssp.) HT, AT, 2 PT
chrysofacialis Linsenmaier, 1984: 221. (*Chrysis (Trichrysis)*) HT, AT, 9 PT

chrysogenalis Linsenmaier, 1969: 374. (*Chrysis (Chrysogona)*) HT
chrysoscutella Linsenmaier, 1959a: 113. (*Chrysis (Chrysis)*) HT, AT, 38 PT
chrysoviolacea Linsenmaier, 1968: 51. (*Chrysis (Chrysogona)*)
chrysurus Linsenmaier, 1969: 373. (*Hedychridium (Hedychridium) moricei* ssp.) HT, AT, 3 PT
ciscirtana Linsenmaier, 1959a: 97. (*Chrysis (Chrysis)*) HT, AT, 19 PT
clancula Linsenmaier, 1999: 39. (*Holopyga (Holopyga)*) HT, AT
clarinicollis Linsenmaier, 1951: 77. (*Chrysis (Chrysis) ignita* var.) LT, 6 PLT
clivosa Linsenmaier, 1959a: 104. (*Chrysis (Chrysis)*) HT
cohaerea Linsenmaier, 1959a: 110. (*Chrysis (Chrysis)*) HT
collaris Linsenmaier, 1959a: 9. (*Cleptes*) HT
colombiana Linsenmaier, 1984: 221. (*Chrysis (Trichrysis)*) 1 PT
comitata Linsenmaier, 1968: 73. (*Chrysis (Chrysis)*) 1 PT
commilita Linsenmaier, 1984: 220. (*Chrysis (Trichrysis)*) HT, 1 PT
compensata Linsenmaier, 1984: 210. (*Chrysis (Trichrysis)*) HT, AT, 51 PT
complementa Linsenmaier, 1984: 213. (*Chrysis (Trichrysis)*) HT, 5 PT
compacticeps Linsenmaier, 1984: 213. (*Chrysis (Trichrysis)*)
concolor Linsenmaier, 1951: 92. (*Stilbum chrysocephalum* var.) HT, 1 PT
conidentata Linsenmaier, 1994a: 169. (*Chrysis (Chrysogona)*)
coniuncta Linsenmaier, 1959a: 100. (*Chrysis (Chrysis)*) HT, 1 PT
consectata Linsenmaier, 1985: 439. (*Neochrysis (Neochrysis)*) HT, 1 PT
continentalis Linsenmaier, 1959b: 238. (*Chrysis (Chrysis) aurotecta* ssp.) HT, AT, 6 PT
convexianalis Linsenmaier, 1994a: 179. (*Chrysis (Chrysis)*) HT, 2 PT
corfouiana Linsenmaier, 1959a: 174. (*Chrysis (Cornuchrysis) cerastes* ssp.) HT, AT, 3 PT
cortii Linsenmaier, 1951: 50. (*Chrysis (Chrysogona) leachii* var.) 2 ST [15 ST]
cratomorpha Linsenmaier, 1968: 69. (*Chrysis (Chrysis) gribodoi* ssp.) HT, AT, 7 PT
creteense Linsenmaier, 1959b: 234. (*Hedychridium hybridum* ssp.) HT, AT, 19 PH
creteensis Linsenmaier, 1959b: 237. (*Chrysis (Chrysis) grohmanni* ssp.) HT, AT, 7 PT
cupricolor Linsenmaier, 1987: 148. (*Chrysis (Chrysis) marani* ssp.) HT, AT, 12 PT
cupriminuta Linsenmaier, 1994a: 176. (*Chrysis (Chrysis)*)
cupritibiale Linsenmaier, 1987: 139. (*Hedychridium (Hedychridium)*) HT
curtina Linsenmaier, 1999: 135. (*Chrysis (Chrysis)*) HT
curtisensis Linsenmaier, 1982: 346. (*Chrysis (Hexachrysis)*)
curtula Linsenmaier, 1999: 133. *Chrysis (Chrysis)* HT, AT, 42 PT [3 PT]
cyaniposticus Linsenmaier, 1982: 332. (*Euchroeus (Primeuchroeus)*) HT, AT, 2 PT
cypernensis Linsenmaier, 1987: 153. (*Chrysis (Pentachrysis) inaequalis* ssp.) HT, AT, 27 PT
cypriana Linsenmaier, 1951: 50. (*Chrysis (Chrysogona) leachii* var.) 2 ST [6 ST]
cypruscula Linsenmaier, 1959a: 34. (*Holopyga*) HT, 15 PT
cyrenaicaensis Linsenmaier, 1968: 116. (*Chrysis (Cornuchrysis) eversmanni* ssp.) HT
dahlbomiana Linsenmaier, 1968: 114. (*Chrysis (Cornuchrysis)*) HT
dalmatina Linsenmaier, 1959a: 131. (*Chrysis (Chrysis) cingulicornis* ssp.) HT, 1 PT
dauriana Linsenmaier, 1959a: 112. (*Chrysis (Chrysis) cavalierei* ssp.) HT, 1 PT
debeaumonti Linsenmaier, 1987: 154. (*Chrysis (Platycelia)*) HT, 3 PT
declarata Linsenmaier, 1968: 104. (*Chrysis (Chrysis) indigotea* ssp.) HT
declinanalis Linsenmaier, 1968: 48. (*Chrysis (Chrysogona)*) HT
declivifrontis Linsenmaier, 1994b: 486. (*Chrysis (Chrysis)*) HT
decolora Linsenmaier, 1959a: 141. (*Chrysis (Chrysis)*) HT
decoloratum Linsenmaier, 1999: 73. (*Hedychridium (Hedychridium) vachali* ssp.) HT, AT, 3 PT
dehyalinata Linsenmaier, 1985: 470. (*Neochrysis (Ipsiura)*) HT, 2 PT
deleta Linsenmaier, 1951: 78. (*Chrysis (Chrysis) ignita* var.) HT
deletitarsis Linsenmaier, 1982: 324. (*Euchroeus (Primeuchroeus) siamensis* ssp.) HT
demelti Linsenmaier, 1987: 145. (*Chrysis (Chrysogona) cuprea* ssp.) HT, 1 PT
demissa Linsenmaier, 1959a: 139. (*Chrysis (Chrysis) berlandi* ssp.) HT, AT, 1 PT
densasculpturata Linsenmaier, 1984: 206. (*Chrysis (Trichrysis)*) HT
densata Linsenmaier, 1999: 38. (*Holopyga (Holopyga)*) HT
densum Linsenmaier, 1959a: 59. (*Hedychridium chloropygum* ssp.) HT
dentaincisa Linsenmaier, 1968: 86. (*Chrysis (Chrysis)*) HT, 2 PT
denticlypeata Linsenmaier, 1984: 220. (*Chrysis (Trichrysis)*) HT, 6 PT
denticula Linsenmaier, 1999: 168. (*Chrysis (Chrysis)*) HT, AT, 2 PT
dentifrontis Linsenmaier, 1982: 338. (*Chrysis (Chrysis)*) HT
dentiincisa Linsenmaier, 1999: 194. (*Chrysis (Chrysis)*) HT, 1 PT
detrita Linsenmaier, 1959a: 34. (*Holopyga cyprusculta* ssp.) HT, 3 PT

diehli Lisenmaier, 1968: 123. (*Chrysis (Hexachrysis)*) HT
dilutius Lisenmaier, 1982: 329. (*Euchroeus (Primeuchroeus) papuanus* ssp.) HT, AT, 46 PT
disclusa Lisenmaier, 1959a: 171. (*Chrysis (Chrysidea) pumila* ssp.) HT, AT, 22 PT
discolor Lisenmaier, 1959a: 32. (*Holopyga chrysonota* ssp.) AT, 8 PT
discordum Lisenmaier, 1959a: 50. (*Hedychridium*) HT
disiunctum Lisenmaier, 1959a: 51. (*Hedychridium*)
dismorphum Lisenmaier, 1959a: 52. (*Hedychridium*) HT
dispar Lisenmaier, 1994b: 490. (*Chrysis (Chrysis)*) HT
dissidentata Lisenmaier, 1985: 478. (*Neochrysis (Ipsiura)*) HT
distincta Lisenmaier, 1985: 460. (*Neochrysis (Neochrysis)*) HT, AT, 2 PT
divaridens Lisenmaier, 1999: 134. (*Chrysis (Chrysis)*)
duplicata Lisenmaier, 1997a: 251. (*Holopyga*) HT, 38 PT
duplicatum Lisenmaier, 1999: 67. (*Hedychridium (Hedychridium)*) HT, AT, 5 PT
duplogermari Lisenmaier, 1987: 148. (*Chrysis (Chrysis)*)
duplomaculata Lisenmaier, 1968: 123. (*Chrysis (Pyria) stilboides* ssp.) 1 PT
duplopilosa Lisenmaier, 1968: 101. (*Chrysis (Chrysis)*)
edessana Lisenmaier, 1987: 150. (*Chrysis (Chrysis) coeruleiventris* ssp.) HT, AT
effrenata Lisenmaier, 1959b: 234. (*Holopyga ovata* ssp.) HT, AT, 19 PT
elevodentata Lisenmaier, 1982: 340. (*Chrysis (Chrysis)*) 1 PT
ellipticus Lisenmaier, 1982: 330. (*Euchroeus (Primeuchroeus)*) HT
elongatum Lisenmaier, 1959a: 57. (*Hedychridium*)
enslini Lisenmaier, 1959a: 27. (*Holopyga*) HT, 1 PT
enslini Lisenmaier, 1951: 90. (*Stilbum calens* var.) HT, AT
erubescens Lisenmaier, 1997a: 283. (*Chrysis (Platycelia)*) HT, AT, 1 PT
espagnola Lisenmaier, 1968: 90. (*Chrysis (Chrysis) anomala* ssp.) HT, AT, 12 PT
etnaense Lisenmaier, 1968: 26. (*Hedychridium (Hedychridium)*) HT
eureka Lisenmaier, 1994b: 487. (*Chrysis (Chrysis)*) HT
euroa Lisenmaier, 1959a: 127. (*Chrysis (Chrysis) splendidula* ssp.) HT, AT, 1 PT
europaea Lisenmaier, 1959a: 104. (*Chrysis (Chrysis) dives* ssp.) HT, AT, 6 PT
europaeum Lisenmaier, 1959a: 39. (*Hedychrum micans* ssp.) HT, AT, 7 PT
exadversa Lisenmaier, 1959b: 238. (*Chrysis (Chrysis) incisa* ssp.) HT, AT, 2 PT
excellens Lisenmaier, 1997a: 279. (*Chrysis (Chrysis)*) HT, AT
exceptionis Lisenmaier, 1999: 170. (*Chrysis (Chrysis)*) HT
excursa Lisenmaier, 1959a: 121. (*Chrysis (Chrysis)*) HT, 1 PT
extera Lisenmaier, 1984: 223. (*Chrysis (Trichrysis)*) HT
extranea Lisenmaier, 1959a: 128. (*Chrysis (Chrysis) rutilans* ssp.) HT, AT, 4 PT
extraneum Lisenmaier, 1993: 723. (*Hedychridium*)
fascialis Lisenmaier, 1959a: 28. (*Holopyga*) HT, AT
feensis Lisenmaier, 1985: 459. (*Neochrysis (Neochrysis)*) HT, AT
fenniensis Lisenmaier, 1959a: 154. (*Chrysis (Chrysis) mediata* ssp.) HT, AT [63 PT]
feritatum Lisenmaier, 1959b: 235. (*Hedychridium aheneum* ssp.) HT, PT
fernandezi Lisenmaier, 1993: 724. (*Chrysis (Chrysogona)*) HT, AT, 3 PT
ferocula Lisenmaier, 1994a: 196. (*Chrysis (Cornuchrysis) chlorospila* ssp.)
feroculum Lisenmaier, 1959a: 56. (*Hedychridium zimmermanni* ssp.)
figurata Lisenmaier, 1997a: 281. (*Chrysis (Chrysis)*) HT
finitima Lisenmaier, 1984: 211. (*Chrysis (Trichrysis)*) HT
flavonigrum Lisenmaier, 1999: 82. (*Hedychridium (Hedychridium)*)
flexilateralis Lisenmaier, 1968: 103. (*Chrysis (Chrysis)*)
foochowia Lisenmaier, 1968: 102. (*Chrysis (Chrysis)*) PT
formosaiense Lisenmaier, 1959a: 41. (*Hedychrum gerstaecheri* ssp.)
fortiterpunctata Lisenmaier, 1959a: 87. (*Chrysis (Chrysogona) loevigata* (!) ssp.) HT, AT, 18 PT
foveafacies Lisenmaier, 1994a: 181. (*Chrysis (Chrysis)*)
foveatidorsa Lisenmaier, 1968: 48. (*Chrysis (Chrysogona)*) HT, AT
franciscae Lisenmaier, 1959a: 89. (*Chrysis (Chrysogona) diacantha* ssp.) HT
franciscae Lisenmaier, 1987: 133. (*Cleptes aerosus* ssp.) HT
franciscanum Lisenmaier, 1987: 140. (*Hedychridium (Hedychridium)*) HT
fretissana Lisenmaier, 1987: 145. (*Chrysis (Chrysogona) rufiventris* ssp.) 1 PT
fulminans Lisenmaier, 1951: 51. (*Chrysis (Chrysogona) germari* var.) 2 ST [15 ST]
garciae Lisenmaier, 1984: 206. (*Chrysis (Trichrysis) silvestrii* ssp.) HT
garianum Lisenmaier, 1968: 24. (*Hedychridium (Hedychridium)*)
geddiensis Lisenmaier, 1968: 113. (*Chrysis (Cornuchrysis)*) HT, AT, 3 PT

gilgitensis Linsenmaier, 1968: 104. (*Chrysis (Chrysis)*) HT
globiscutella Linsenmaier, 1993: 728. (*Chrysis (Chrysis)*) 3 PT [1 PT]
gracilia Linsenmaier, 1985: 463. (*Neochrysis (Exsecocrysis)*) HT
gracilipes Linsenmaier, 1999: 50. (*Hedychrum*) HT
graeciana Linsenmaier, 1968: 111. (*Chrysis (Cornuchrysis) fulvicornis* ssp.) HT, AT, 16 PT
granadana Linsenmaier, 1968: 17. (*Holopyga ignicollis* ssp.) HT, AT, 8 PT
guadarrama Linsenmaier, 1987: 135. (*Holopyga*) HT, AT, 82 PT
guayanensis Linsenmaier, 1997a: 267. (*Neochrysis (Ipsiura)*)
guichardi Linsenmaier, 1968: 91. (*Chrysis (Chrysis)*)
guichardi Linsenmaier, 1994a: 163. (*Hedychridium (Hedychridium)*)
gurunensis Linsenmaier, 1987: 134. (*Cleptes scutellaris* ssp.) HT, 1 PT
gusenleitneri Linsenmaier, 1968: 76. (*Chrysis (Chrysis)*) HT, AT
hadramauta Linsenmaier, 1994a: 185. (*Chrysis (Chrysis)*) HT
hamanni Linsenmaier, 1968: 111. (*Chrysis (Cornuchrysis) rectianalis* ssp.) HT
hameri Linsenmaier, 1994a: 179. (*Chrysis (Chrysis)*)
hattaensis Linsenmaier, 1994a: 181. (*Chrysis (Chrysis)*) 1 PT
hauseri Linsenmaier, 1999: 61. (*Hedychridium (Hedychridium)*) HT
hebraeica Linsenmaier, 1959a: 88. (*Chrysis (Chrysogona) phryne* ssp.) HT
helleniensis Linsenmaier, 1968: 48. (*Chrysis (Chrysogona) purpureifrons* ssp.) HT, AT, 39 PT
helveticus Linsenmaier, 1959a: 16. (*Omalus (Omalus)*)
hemichlora Linsenmaier, 1951: 66. (*Chrysis (Spintharis) interjecta* var.) 2 ST [4 ST]
heminigrum Linsenmaier, 1997a: 255. (*Hedychridium (Hedychridium) franciscanum* ssp.) HT, AT
hemisimpla Linsenmaier, 1959a: 27. (*Holopyga mlokosiewitzi* ssp.) HT, 1 PT
heraklionica Linsenmaier, 1968: 64. (*Chrysis (Chrysis)*) HT, AT
hermonensis Linsenmaier, 1999: 153. (*Chrysis (Chrysis)*) HT, AT, 1 PT
hiberus Linsenmaier, 1987: 143. (*Euchroeus (Spinolia)*) HT, 5 PT
hohmanni Linsenmaier, 1993: 724. (*Chrysis (Chrysis)*) 4 PT
holopygum Linsenmaier, 1994a: 165. (*Hedychridium (Hedychridium)*)
homalosomus Linsenmaier, 1994a: 160. (*Hedychridium (Prochridium)*)
hubrichi Linsenmaier, 1985: 441. (*Neochrysis (Neochrysis)*) 3 PT
hyalifoveolata Linsenmaier, 1984: 215. (*Chrysis (Trichrysis)*) HT, AT, 17 PT
hybridum Linsenmaier, 1959a: 53. (*Hedychridium*) HT, 1 PT
hylae Linsenmaier, 1968: 106. (*Chrysis (Platycelia) ehrenbergi* ssp.) HT, AT, 7 PT
iberica Linsenmaier, 1959a: 131. (*Chrysis (Chrysis) bidentata* ssp.) HT, AT, 22 PT
ibericum Linsenmaier, 1959a: 52. (*Hedychridium*) HT
ibericus Linsenmaier, 1959a: 73. (*Euchroeus (Euchroeus) purpuratus* ssp.) HT, AT, 2 PT
ignea Linsenmaier, 1968: 15. (*Holopyga mlokosiewitzi* ssp.) HT, AT, 3 PT
ignescoa Linsenmaier, 1959a: 120. (*Chrysis (Chrysis)*) HT, AT, 8 PT
ignigena Linsenmaier, 1959a: 120. (*Chrysis (Chrysis)*) HT
ignota Linsenmaier, 1999: 160. (*Chrysis (Chrysis)*) HT
imminenta Linsenmaier, 1984: 223. (*Chrysis (Trichrysis)*) HT
immixta Linsenmaier, 1984: 211. (*Chrysis (Trichrysis)*) HT
inambitiosa Linsenmaier, 1959a: 111. (*Chrysis (Chrysis)*) HT, AT [1 PT]
incisicollis Linsenmaier, 1982: 324. (*Euchroeus (Primeuchroeus)*)
inclinata Linsenmaier, 1959a: 110. (*Chrysis (Chrysis)*) HT
inconspicua Linsenmaier, 1984: 216. (*Chrysis (Trichrysis)*) HT, AT
indicus Linsenmaier, 1968: 124. (*Parnopes*) 3 PT
indistincta Linsenmaier, 1985: 461. (*Neochrysis (Neochrysis)*)
infantum Linsenmaier, 1997a: 254. (*Hedychridium (Hedychridium)*) HT, AT, 5 PT
insequosum Linsenmaier, 1959a: 56. (*Hedychridium*) HT
insulare Linsenmaier, 1959a: 62. (*Hedychridium irregularare* ssp.) HT, 16 PT
insuturalis Linsenmaier, 1985: 440. (*Neochrysis (Neochrysis)*) HT
intercurra Linsenmaier, 1968: 58. (*Chrysis (Chrysis)*) HT
interdichroa Linsenmaier, 1959a: 86. (*Chrysis (Chrysogona)*) HT, AT
intergermari Linsenmaier, 1959a: 116. (*Chrysis (Chrysis) germari* ssp.) HT, AT, 8 PT
interpellator Linsenmaier, 1968: 95. (*Chrysis (Chrysis)*) HT, AT
interrogatum Linsenmaier, 1959a: 50. (*Hedychridium buyssoni* ssp.) HT, AT, 1 PT
intersa Linsenmaier, 1959a: 33. (*Holopyga*) AT, 1 PT [3 PT]
inusitatum Linsenmaier, 1959a: 56. (*Hedychridium*) HT
invisa Linsenmaier, 1984: 210. (*Chrysis (Trichrysis)*) HT, 3 PT
iocosa Linsenmaier, 1968: 75. (*Chrysis (Chrysis)*) HT

- iocosum* Linsenmaier, 1959a: 47. (*Hedychridium*)
iridifum Linsenmaier, 1994a: 166. (*Hedychridium* (*Hedychridium*))
irregularare Linsenmaier, 1959a: 62. (*Hedychridium*) HT
irreputata Linsenmaier, 1959a: 111. (*Chrysis* (*Chrysis*)) HT, AT, 2 PT
israelia Linsenmaier, 1959a: 116. (*Chrysis* (*Chrysis*)) HT, AT, 2 PT
israelicum Linsenmaier, 1968: 27. (*Hedychridium* (*Hedychridium*)) HT
israelicus Linsenmaier, 1959a: 71. (*Euchroeus* (*Euchroeus*) *oculatissimus* ssp.) HT
israelium Linsenmaier, 1959a: 36. (*Hedychrum* *bleusei* ssp.) HT
japanensis Linsenmaier, 1951: 78. (*Chrysis* (*Chrysis*)) *ignita* var.) HT
jemenensis Linsenmaier, 1994a: 151. (*Omalus* (*Philoctetes*)) HT
jemenensis Linsenmaier, 1987: 156. (*Parnopes* *grandior* ssp.) HT
jendoubense Linsenmaier, 1987: 140. (*Hedychridium* (*Hedychridium*) *coriaceum* ssp.) HT, AT
jerichoensis Linsenmaier, 1959a: 67. (*Euchroeus* (*Pseudospinolia*) *humboldti* ssp.) HT
jordanense Linsenmaier, 1968: 27. (*Hedychridium* (*Hedychridium*)) HT
jordanica Linsenmaier, 1959a: 89. (*Chrysis* (*Chrysogona*) *gracillima* ssp.) HT, AT, 1 PT
jordanicus Linsenmaier, 1968: 4. (*Cleptes*) HT, 1 PT
jordanicus Linsenmaier, 1968: 46. (*Euchroeus* (*Euchroeus*)) HT, AT
juengeri Linsenmaier, 1994c: 514. (*Cleptes*) HT, 4 PT
katanganus Linsenmaier, 1968: 42. (*Euchroeus* (*Afrospinolia*)) HT
kenitranum Linsenmaier, 1999: 64. (*Hedychridium* (*Hedychridium*)) HT
konyaca Linsenmaier, 1968: 64. (*Chrysis* (*Chrysis*)) HT
kremastiana Linsenmaier, 1959a: 148. (*Chrysis* (*Chrysis*)) HT
krkiana Linsenmaier, 1959a: 109. (*Chrysis* (*Chrysis*)) *grohmanni* ssp.) HT, AT, 56 PT [7 PT]
laetiapicalis Linsenmaier, 1985: 477. (*Neochrysis* (*Ipsiura*)) HT
laeticum Linsenmaier, 1959a: 51. (*Hedychridium*)
laeviclypeatum Linsenmaier, 1999: 77. (*Hedychridium* (*Hedychridium*)) HT
laevidentata Linsenmaier, 1994a: 169. (*Chrysis* (*Chrysogona*))
laevifacies Linsenmaier, 1999: 12. (*Cleptes*) HT
laevimarginata Linsenmaier, 1987: 154. (*Chrysis* (*Pentachrysis*)) HT, AT, 16 PT [1 PT]
lanceolata Linsenmaier, 1959a: 121. (*Chrysis* (*Chrysis*)) HT, 1 PT
larochei Linsenmaier, 1993: 725. (*Chrysis* (*Chrysis*))
latifacies Linsenmaier, 1999: 215. (*Chrysis* (*Chrysis*)) HT, 1 PT
latilateralis Linsenmaier, 1985: 444. (*Neochrysis* (*Neochrysis*)) HT
latitudum Linsenmaier, 1959a: 39. (*Hedychrum*) HT
lepidula Linsenmaier, 1959a: 123. (*Chrysis* (*Chrysis*)) *sardarica* ssp.) HT
lepidum Linsenmaier, 1959a: 42. (*Hedychrum* *rufipes* ssp.) HT
libanense Linsenmaier, 1987: 139. (*Hedychridium* (*Hedychridium*)) *verhoeffi* ssp.) HT
libanesus Linsenmaier, 1959a: 67. (*Euchroeus* (*Pseudospinolia*) *humboldti* ssp.) HT, 1 PT
libanonensis Linsenmaier, 1968: 81. (*Chrysis* (*Chrysis*)) *cingulicornis* ssp.) HT, AT
libanoticus Linsenmaier, 1959a: 9. (*Cleptes*) HT
liliputana Linsenmaier, 1999: 41. (*Holopyga* (*Holopyga*)) HT
limaca Linsenmaier, 1984: 203. (*Chrysis* (*Trichrysis*)) HT [AT, 1 PT]
limaca Linsenmaier, 1985: 460. (*Neochrysis* (*Neochrysis*)) HT, AT [1 PT]
linigera Linsenmaier, 1984: 210. (*Chrysis* (*Trichrysis*))
longigenis Linsenmaier, 1982: 325. (*Euchroeus* (*Primeuchroeus*)) HT, AT, 2 PT
longimaculata Linsenmaier, 1997a: 270. (*Chrysis* (*Chrysogona*))
longitarsis Linsenmaier, 1985: 459. (*Neochrysis* (*Neochrysis*)) HT
lucida Linsenmaier, 1951: 51. (*Chrysis* (*Chrysogona*)) *germari* var.) HT, 1 PT
lucidula Linsenmaier, 1997a: 274. (*Chrysis* (*Chrysis*)) HT
luteipenne Linsenmaier, 1968: 22. (*Hedychridium* (*Hedychridium*)) HT
lygaea Linsenmaier, 1997a: 286. (*Chrysis* (*Cornuchrysis*)) *ambigua* ssp.) HT, AT, 4 PT
maculatus Linsenmaier, 1968: 6. (*Cleptes*) HT
maculitarsis Linsenmaier, 1982: 327. (*Euchroeus* (*Primeuchroeus*)) HT, 1 PT
maderi Linsenmaier, 1959a: 122. (*Chrysis* (*Chrysis*)) HT, AT, 3 PT
magnifacialis Linsenmaier, 1993: 728. (*Chrysis* (*Chrysis*))
magnitudina Linsenmaier, 1959a: 133. (*Chrysis* (*Chrysis*)) HT, AT
maineensis Linsenmaier, 1994b: 486. (*Chrysis* (*Chrysis*)) HT
malayensis Linsenmaier, 1982: 324. (*Euchroeus* (*Primeuchroeus*))) 1 PT
maliensis Linsenmaier, 1997a: 276. (*Chrysis* (*Chrysis*))
mallorcanica Linsenmaier, 1959a: 116. (*Chrysis* (*Chrysis*)) *germari* ssp.
mallorcanus Linsenmaier, 1959a: 19. (*Omalus* (*Omalus*) *chlorosomus* ssp.) HT, 1 PT

maroccanus Linsenmaier, 1987: 134. (*Cleptes*) HT, 1 PT
maroccense Linsenmaier, 1959a: 64. (*Hedychridium*) HT, AT, 13 PT
martensi Linsenmaier, 1951: 64. (*Chrysis (Spintharis) scutellaris* var.) 8 ST
martensi Linsenmaier, 1951: 24. (*Hedychridium reticulatum* var.) HT
matmatana Linsenmaier, 1997a: 272. (*Chrysis (Chrysogona) candens* ssp.)
mattheyi Linsenmaier, 1959a: 27. (*Holopyga*) 6 PT
mediadentata Linsenmaier, 1951: 75. (*Chrysis (Chrysis) ignita* var.) LT, 1 PLT [93 PLT]
mediana Linsenmaier, 1987: 149. (*Chrysis (Chrysis) interjecta* ssp.) HT, 1 PT
mediata Linsenmaier, 1951: 76. (*Chrysis (Chrysis) ignita* var.) LT, 1 PT [126 PLT]
mediocre Linsenmaier, 1959a: 63. (*Hedychridium*) HT, 15 PT
mediocrum Linsenmaier, 1987: 142. (*Hedychridium (Hedychridium)*) HT
meknesia Linsenmaier, 1999: 31. (*Holopyga (Holopyga)*) HT, AT, 23 PT
melaensis Linsenmaier, 1968: 99. (*Chrysis (Chrysis) ignita* ssp.) HT, AT, 14 PT
meridionalis Linsenmaier, 1984: 218. (*Chrysis (Trichrysis) mucronata* ssp.) HT, AT, 2 PT
meyeri Linsenmaier, 1959a: 137. (*Chrysis (Chrysis)*) HT
mezadana Linsenmaier, 1968: 64. (*Chrysis (Chrysis)*) HT
minuma Linsenmaier, 1959a: 31. (*Holopyga*) HT, AT, 1 PT
mistrasensis Linsenmaier, 1968: 49. (*Chrysis (Chrysogona)*) HT, AT, 7 PT
moczari Linsenmaier, 1959a: 122. (*Chrysis (Chrysis)*) HT, AT
moczari Linsenmaier, 1968: 4. (*Cleptes*) HT, AT, 13 PT
modicus Linsenmaier, 1987: 143. (*Euchroeus (Spinolia)*) HT, 1 PT
monotona Linsenmaier, 1985: 442. (*Neochrysis (Neochrysis)*) HT
monticola Linsenmaier, 1999: 168. (*Chrysis (Chrysis)*) HT, AT, 3 PT
mosulensis Linsenmaier, 1968: 59. (*Chrysis (Chrysis)*) HT
mutense Linsenmaier, 1968: 130. (*Hedychridium (Hedychridium) rhodojanthinum* ssp.) HT, AT, 1 PT
mutincisa Linsenmaier, 1968: 86. (*Chrysis (Chrysis)*) HT, AT, 14 PT
mysticalis Linsenmaier, 1959a: 165. (*Chrysis (Pentachrysis)*) HT, AT, 13 PT
naefi Linsenmaier, 1959a: 112. (*Chrysis (Chrysis) schousboei* ssp.) HT
naefi Linsenmaier, 1959a: 26. (*Holopyga*) HT, AT, 2 PT
nankingensis Linsenmaier, 1959a: 153. (*Chrysis (Chrysis) rutiliventris* ssp.) HT
nasiclypeata Linsenmaier, 1984: 205. (*Chrysis (Trichrysis)*)
neftaica Linsenmaier, 1999: 237. (*Chrysis (Cornuchrysis)*) HT
neglectoides Linsenmaier, 1959a: 66. (*Euchroeus (Pseudospinolia)*) HT
nevadensis Linsenmaier, 1987: 151. (*Chrysis (Chrysis) atraclypeata* ssp.) HT
niemelai Linsenmaier, 1959a: 38. (*Hedychrum aureicolle* ssp.) HT, AT, 174 PT
nigridorsa Linsenmaier, 1985: 458. (*Neochrysis (Neochrysis)*) HT
nigromaculatus Linsenmaier, 1997a: 249. (*Omalus (Chrysellampus)*) HT
niliaca Linsenmaier, 1968: 73. (*Chrysis (Chrysis)*) HT
nipponica Linsenmaier, 1951: 78. Nec Uchida, 1927. (*Chrysis (Chrysis) ignita* var.) LT, 1 PLT
obliquata Linsenmaier, 1968: 55. (*Chrysis (Chrysis)*) HT, AT
obscurifacies Linsenmaier, 1999: 63. (*Hedychridium (Hedychridium)*) HT
obscuriventris Linsenmaier, 1968: 57. (*Chrysis (Chrysis)*) HT, AT, PT
occidenta Linsenmaier, 1959a: 31. (*Holopyga amoena* ssp.) HT, AT, 3 PT
occidentica Linsenmaier, 1987: 153. (*Chrysis (Pentachrysis) seminigra* ssp.) HT, AT, 35 PT
occidentus Linsenmaier, 1968: 11. (*Omalus (Omalus) horvathi* ssp.) HT, AT
omanensis Linsenmaier, 1994a: 174. (*Chrysis (Chrysis)*)
opaca Linsenmaier, 1959a: 135. (*Chrysis (Chrysis) sybarita* ssp.) HT, 18 PT
orgopia Linsenmaier, 1968: 47. (*Chrysis (Chrysogona) judith* ssp.) HT, AT, PT
oriensa Linsenmaier, 1959a: 31. (*Holopyga amoena* ssp.) HT, AT, 5 PT
orienticola Linsenmaier, 1994a: 175. (*Chrysis (Chrysis)*) HT
orionea Linsenmaier, 1951: 55. (*Chrysis (Chrysogona) pyrophana* var.) 19 ST
ortegai Linsenmaier, 1993: 722. (*Omalus (Philotetes) caudatus* ssp.)
pacifica Linsenmaier, 1951: 89. (*Stilbum cyanurum* var.) 22 ST
padri Linsenmaier, 1987: 136. (*Holopyga (Holopyga) ignicollis* ssp.) HT, AT, 3 PT
palmachinensis Linsenmaier, 1987: 149. (*Chrysis (Chrysis) aurelia* ssp.) 1 PT
paraca Linsenmaier, 1984: 211. (*Chrysis (Trichrysis)*) HT
paradoxa Linsenmaier, 1968: 53. (*Chrysis (Papuachrysis)*) HT
paraguaya Linsenmaier, 1985: 459. (*Neochrysis (Neochrysis)*) HT?, 1 PT
paranaca Linsenmaier, 1984: 206. (*Chrysis (Trichrysis)*) HT
parcirtana Linsenmaier, 1999: 125. (*Chrysis (Chrysis) kalliope* ssp.) HT, AT, 37 PT [3 PT]
parcobarbatum Linsenmaier, 1999: 65. (*Hedychridium (Hedychridium)*) AT, 6 PT

paris Linsenmaier, 1997a: 263. (*Euchroeus (Pseudospinolia) incrassatus* ssp.) HT, AT, 6 PT
parviapicalis Linsenmaier, 1985: 445. (*Neochrysis (Neochrysis)*) HT
parvicapito Linsenmaier, 1999: 199. (*Chrysis (Chrysis)*) HT
parvicavitaire Linsenmaier, 1994a: 157. (*Hedychrum*) 1 PT
parvicornis Linsenmaier, 1987: 137. (*Holopyga (Chamaeholopyga)*) HT, AT
parvidentata Linsenmaier, 1999: 242. (*Chrysis (Cornuchrysis)*) 1 PT
parvifacialis Linsenmaier, 1982: 331. (*Euchroeus (Primeuchroeus)*) HT, 1 PT
parvimediatata Linsenmaier, 1982: 346. (*Chrysis (Hexachrysis)*) 1 PT
parviocellaris Linsenmaier, 1968: 65. (*Chrysis (Chrysis)*)
parvistoma Linsenmaier, 1999: 216. (*Chrysis (Chrysis)*) HT
patrasensis Linsenmaier, 1968: 74. (*Chrysis (Chrysis) martinella* ssp.) HT, AT, 16 PT
patruela Linsenmaier, 1999: 128. (*Chrysis (Chrysis)*) HT, AT
pauloradialis Linsenmaier, 1982: 325. (*Euchroeus (Primeuchroeus)*)
peculiarecornis Linsenmaier, 1985: 458. (*Neochrysis (Neochrysis)*) HT, AT, 12 PT
peculiaris Linsenmaier, 1999: 130. (*Chrysis (Chrysis)*) HT, AT
peloponnense Linsenmaier, 1968: 31. (*Hedychridium (Hedychridium) elegantulum* ssp.) HT, AT, 4 PT
pentapromotus Linsenmaier, 1982: 326. (*Euchroeus (Primeuchroeus)*) HT
perapedia Linsenmaier, 1968: 93. (*Chrysis (Chrysis) caucasiensis* ssp.) HT
perexigua Linsenmaier, 1959a: 99. (*Chrysis (Chrysis)*) HT, AT
perraudini Linsenmaier, 1999: 159. (*Chrysis (Chrysis)*) HT, AT, 12 PT
perraudini Linsenmaier, 1968: 126. (*Hedychridium (Hedychridium)*) HT
perraudini Linsenmaier, 1968: 10. (*Omalus (Omalus)*) HT, AT, 5 PT
perrecta Linsenmaier, 1959a: 123. (*Chrysis (Chrysis) sardarica* ssp.) HT, AT, 14 PT
perscitum Linsenmaier, 1959a: 52. (*Hedychridium*) HT, AT, 10 PT
perthensis Linsenmaier, 1982: 343. (*Chrysis (Hexachrysis)*)
peruana Linsenmaier, 1985: 459. (*Neochrysis (Neochrysis)*) HT
piligastre Linsenmaier, 1969: 373. (*Hedychridium (Hedychridium)*) HT
pilosalateralis Linsenmaier, 1959a: 144. (*Chrysis (Chrysis)*) HT, AT, 27 PT
placare Linsenmaier, 1968: 37. (*Hedychridium (Hedychridium)*) HT
planidorsa Linsenmaier, 1985: 440. (*Neochrysis (Neochrysis)*) HT
plaumannii Linsenmaier, 1984: 216. (*Chrysis (Trichrysis)*) HT, 2 PT
plaumannii Linsenmaier, 1985: 453. (*Neochrysis (Neochrysis)*) HT
porosanum Linsenmaier, 1959a: 182. (*Stilbum calens* ssp.) HT, 1 PT
portmanni Linsenmaier, 1968: 98. (*Chrysis (Chrysis) rutiliventris* ssp.) HT, AT, 5 PT
portugalia Linsenmaier, 1959a: 120. (*Chrysis (Chrysis)*) HT, AT, 2 PT
postthoracicum Linsenmaier, 1959a: 51. (*Hedychridium*)
potentera Linsenmaier, 1959a: 90. (*Chrysis (Chrysogona) ragusai* (!) ssp.) HT, 3 PT
praecipua Linsenmaier, 1987: 156. (*Chrysis (Hexachrysis)*) HT, AT, 3 PT
proba Linsenmaier, 1959a: 153. (*Chrysis (Chrysis) rutiliventris* ssp.) HT
proceraula Linsenmaier, 1951: 61. (*Chrysis (Spintharis) cylindrica* var.) 5 ST [42 ST]
prochloropygum Linsenmaier, 1959a: 60. (*Hedychridium subroseum* ssp.) HT
procuprata Linsenmaier, 1959a: 101. (*Chrysis (Chrysis)*) HT, 1 PT
prodichroa Linsenmaier, 1959a: 84. (*Chrysis (Chrysogona)*) HT
prodives Linsenmaier, 1968: 60. (*Chrysis (Chrysis)*) HT
profugax Linsenmaier, 1968: 55. (*Chrysis (Chrysis)*) HT
progressa Linsenmaier, 1959a: 138. (*Chrysis (Chrysis) rufitarsis* ssp.) HT, 1 PT
prohybrida Linsenmaier, 1959a: 97. (*Chrysis (Chrysis)*) HT
projucundum Linsenmaier, 1959a: 49. (*Hedychridium*) HT
promerea Linsenmaier, 1959a: 140. (*Chrysis (Chrysis)*) HT, AT
prominea Linsenmaier, 1959a: 131. (*Chrysis (Chrysis) bidentata* ssp.) HT, AT, 40 PT
prominentula Linsenmaier, 1959a: 129. (*Chrysis (Chrysis) insperata* ssp.) HT, AT, 13 PT
pronigritus Linsenmaier, 1968: 6. (*Cleptes*) HT, 2 PT
propinquata Linsenmaier, 1968: 62. (*Chrysis (Chrysis)*) HT, AT, 7 PT
proreticulatum Linsenmaier, 1999: 67. (*Hedychridium (Hedychridium)*) HT, AT, 5 PT [1 PT]
prospinigera Linsenmaier, 1985: 451. (*Neochrysis (Neochrysis)*) HT, 3 PT
prosuccincta Linsenmaier, 1968: 70. (*Chrysis (Chrysis)*) HT, AT
provenceana Linsenmaier, 1959a: 145. (*Chrysis (Chrysis)*) HT, AT, 6 PT
proviridis Linsenmaier, 1959a: 31. (*Holopyga ovata* ssp.) HT, AT, 1 PT
pseudanatolica Linsenmaier, 1968: 131. (*Chrysis (Chrysis)*) HT
pseudaptata Linsenmaier, 1984: 213. (*Chrysis (Trichrysis)*) 2 PT
pseudignita Linsenmaier, 1987: 152. (*Chrysis (Chrysis) magnidens* ssp.) HT, AT, 1 PT

pseudoanalis Lisenmaier, 1968: 93. (*Chrysis (Chrysis)*) HT, AT, 3 PT
pseudobrevitarsis Lisenmaier, 1951: 79. (*Chrysis (Chrysis) ignita* var.) LT, 1 PLT [49 PLT]
pseudocerastes Lisenmaier, 1959a: 175. (*Chrysis (Cormuchrysis) ambigua* ssp.) HT
pseudodichroa Lisenmaier, 1959a: 86. (*Chrysis (Chrysogona)*) HT, AT, 17 PT
pseudogribodoi Lisenmaier, 1959b: 237. (*Chrysis (Chrysis) cohaerea* ssp.) HT, AT, 5 PT
pseudohybrida Lisenmaier, 1999: 124. (*Chrysis (Chrysis)*) HT, AT, 1 PT
pseudoincrassatum Lisenmaier, 1968: 34. (*Hedychridium (Hedychridium)*) HT
pseudopyrrhina Lisenmaier, 1959a: 131. (*Chrysis (Chrysis) cingulicornis* ssp.) HT
pseudoroiseum Lisenmaier, 1959a: 60. (*Hedychridium*) HT, 3 PT
pseudoscutellaris Lisenmaier, 1959b: 238. (*Chrysis (Chrysis)*) HT, AT, 9 PT
pseudovata Lisenmaier, 1987: 135. (*Holopyga (Holopyga)*) HT, AT
pulawskii Lisenmaier, 1968: 41. (*Euchroeus (Spinolia)*) HT
pulawskii Lisenmaier, 1968: 14. (*Holopyga*) HT, AT, 1 PT
pumilionis Lisenmaier, 1987: 155. (*Chrysis (Trichrysis)*) HT [88 PT]
puncticeps Lisenmaier, 1994a: 151. (*Omalus (Omalus)*) 3 PT
punctum Lisenmaier, 1994a: 159. (*Hedychridium (Prochridium)*) 2 PT
raucum Lisenmaier, 1997a: 258. (*Hedychridium (Hedychridium) maculiventre* ssp.) HT, AT, 5 PT
rectianale Lisenmaier, 1999: 56. (*Hedychridium (Hedychridium)*) HT
rectianalis Lisenmaier, 1968: 110. (*Chrysis (Cornuchrysis)*) HT, AT, 1 PT
rectiangulatus Lisenmaier, 1982: 332. (*Euchroeus (Primeuchroeus)*) HT, AT, 6 PT
reducta Lisenmaier, 1959a: 30. (*Holopyga punctatissima* ssp.) HT, 1 PT
reductidentata Lisenmaier, 1997a: 278. (*Chrysis (Chrysis) berlandi* ssp.) HT, AT, 1 PT
refrigerata Lisenmaier, 1959a: 121. (*Chrysis (Chrysis)*) HT, AT, 1 PT
regularita Lisenmaier, 1985: 440. (*Neochrysis (Neochrysis)*) HT, AT, 3 PT
retracta Lisenmaier, 1959a: 103. (*Chrysis (Chrysis)*) HT
rhodesiaca Lisenmaier, 1959a: 133. (*Chrysis (Chrysis) pyrrhina* ssp.) HT, AT
rhodicypria Lisenmaier, 1959a: 164. (*Chrysis (Chrysis) sexdentata* ssp.) HT, AT, 14 PT
rhodicyprum Lisenmaier, 1987: 137. (*Hedychrum aureicolle* ssp.) HT, AT, 23 PT
rhodosiana Lisenmaier, 1959a: 87. (*Chrysis (Chrysogona) dichroa* ssp.) HT
richardsi Lisenmaier, 1984: 215. (*Chrysis (Trichrysis)*)
riessi Lisenmaier, 1982: 338. (*Chrysis (Chrysis)*) HT, AT, 7 PT
riessi Lisenmaier, 1982: 325. (*Euchroeus (Primeuchroeus)*) HT, AT, 4 PT
rigiana Lisenmaier, 1951: 62. (*Chrysis (Spintharis) rutilans* var.) 5 ST
riyadhensis Lisenmaier, 1994a: 150. (*Omalus (Omalus)*) HT
robusta Lisenmaier, 1951: 65. (*Chrysis (Spintharis) interjecta* var.) 1 ST
rossi Lisenmaier, 1984: 207. (*Chrysis (Trichrysis)*) 1 PT
rostrevorana Lisenmaier, 1982: 344. (*Chrysis (Hexachrysis)*) HT
rubrescens Lisenmaier, 1999: 76. (*Hedychridium (Hedychridium)*) HT, AT, 1 PT
rubinanalis Lisenmaier, 1959a: 167. (*Chrysis (Chrysis)*) HT
ruborum Lisenmaier, 1959a: 50. (*Hedychridium marteni* ssp.) HT
rubra Lisenmaier, 1999: 31. (*Holopyga (Holopyga)*) HT, AT, 27 PT
rubrafeminae Lisenmaier, 1968: 79. (*Chrysis (Chrysis) episcopalis* ssp.) HT, AT, 4 PT
rubrinigra Lisenmaier, 1999: 42. (*Holopyga (Holopyga)*) HT, PT
rubrocoerulea Lisenmaier, 1968: 70. (*Chrysis (Chrysis)*) 4 PT
rubrum Lisenmaier, 1968: 128. (*Hedychridium (Hedychridium)*) HT
rufirostris Lisenmaier, 1999: 26. (*Omalus (Elampus)*) HT
rufitegulata Lisenmaier, 1984: 211. (*Chrysis (Trichrysis)*) 2 PT
rugulosum Lisenmaier, 1959a: 57. (*Hedychridium flavipes* ssp.) HT, AT, 1 PT
rugulosus Lisenmaier, 1968: 8. (*Cleptes*) HT
russica Lisenmaier, 1959a: 116. (*Chrysis (Chrysis)*)
saginata Lisenmaier, 1982: 341. (*Chrysis (Chrysis)*)
saladoensis Lisenmaier, 1984: 215. (*Chrysis (Trichrysis)*) 1 PT
santschii Lisenmaier, 1959a: 120. (*Chrysis (Chrysis)*) 4 PT
sardiniente Lisenmaier, 1959b: 235. (*Hedychridium mediocre* ssp.) HT, AT, 2 PT
sardinensis Lisenmaier, 1959a: 97. (*Chrysis (Chrysis) hybrida* ssp.) HT
sardinum Lisenmaier, 1997a: 258. (*Hedychridium (Hedychridium)*) HT
saudiarabica Lisenmaier, 1968: 106. (*Chrysis (Pentachrysis) seminigra* ssp.) HT
schenkiana Lisenmaier, 1959a: 156. (*Chrysis (Chrysis) ignita* ssp.) HT, AT [27 PT]
schlaeflei Lisenmaier, 1997a: 269. (*Chrysis (Chrysogona) sulcata* ssp.) HT
schlaeflei Lisenmaier, 1999: 95. (*Euchroeus (Spinolia)*) HT, AT
schlaeflei Lisenmaier, 1985: 474. (*Neochrysis (Ipsiura)*) HT, AT

- schmidti* Linsenmaier, 1999: 199. (*Chrysis (Chrysis)*) HT
schmidti Linsenmaier, 1968: 8. (*Cleptes*) HT, AT
schmidti Linsenmaier, 1987: 143. (*Euchroeus (Spinolia)*) HT, PT
schwarzi Linsenmaier, 1968: 51. (*Chrysis (Chrysogona) concolor* ssp.) HT, AT
sculptidiscalis Linsenmaier, 1987: 154. (*Chrysis (Pentachrysis)*) HT
sculpturatissimum Linsenmaier, 1959a: 63. (*Hedychridium maculiventre* ssp.) HT, AT, 3 PT
sculpturatissimus Linsenmaier, 1959a: 67. (*Euchroeus (Pseudospinolia) humboldti* ssp.) HT, AT, 11 PT
scutellare Linsenmaier, 1969: 373. (*Hedychrum*) HT
scyphiphora Linsenmaier, 1984: 223. (*Chrysis (Trichrysis)*) HT, AT, 1 PT
seidenstueckeri Linsenmaier, 1959: 10. (*Cleptes*) HT
semiatrus Linsenmaier, 1968: 7. (*Cleptes*) HT
semicupreus Linsenmaier, 1959b: 233. (*Omalus (Omalus) pusillus* ssp.) HT, 2 PT
semiluteum Linsenmaier, 1959a: 60. (*Hedychridium*) HT, 1 PT
semirugulosa Linsenmaier, 1999: 206. (*Chrysis (Chrysis)*) HT, 1 PT
semistriata Linsenmaier, 1997a: 274. (*Chrysis (Chrysis) succincta* ssp.) HT, AT, 6 PT
semiviridana Linsenmaier, 1959a: 175. (*Chrysis (Cornuchrysis) semiviolacea* ssp.) HT, 1 PT
sericalineata Linsenmaier, 1984: 213. (*Chrysis (Trichrysis)*) HT
sericatum Linsenmaier, 1994a: 160. (*Hedychridium (Prochridium)*) 1 PT
sertavulacus Linsenmaier, 1987: 143. (*Euchroeus (Spinolia) rogenhoferi* ssp.) HT, 1 PT
sertavulensis Linsenmaier, 1968: 134. (*Chrysis (Chrysis) rutiliventris* ssp.) HT, AT
sevillanum Linsenmaier, 1968: 28. (*Hedychridium*) HT, 2 PT
siciliaca Linsenmaier, 1959a: 134. (*Chrysis (Chrysis) pyrrhina* ssp.) HT, AT, 3 PT
sillensis Linsenmaier, 1987: 146. (*Chrysis (Chrysogona) varidens* ssp.) HT, AT
similitudina Linsenmaier, 1959a: 132. (*Chrysis (Chrysis) pulcherrima* ssp.) HT, AT, 9 PT [3 PT]
simplicita Linsenmaier, 1994a: 174. (*Chrysis (Chrysis)*)
simplifacies Linsenmaier, 1982: 345. (*Chrysis (Hexachrysis)*) HT, 1 PT
simpliconica Linsenmaier, 1951: 64. (*Chrysis (Spintharis) analis* var.) 2 ST [4 ST]
simulacra Linsenmaier, 1959a: 86. (*Chrysis (Chrysogona)*) HT
simuldichroa Linsenmaier, 1969: 375. (*Chrysis (Chrysogona)*) HT, AT, 20 PT
simulpriesneri Linsenmaier, 1968: 92. (*Chrysis (Chrysis)*)
siziliana Linsenmaier, 1959a: 104. (*Chrysis (Chrysis) calimorpha* ssp.) HT
sobrina Linsenmaier, 1985: 474. (*Neochrysis (Ipsiura)*) HT
sokotranum Linsenmaier, 1987: 156. (*Stilbum cyanurum* ssp.) 2 PT
sorianum Linsenmaier, 1959a: 59. (*Hedychridium lampadum* ssp.) HT, 4 PT
soussensis Linsenmaier, 1999: 113. (*Chrysis (Chrysogona) diacantha* ssp.)
sparsapunctatum Linsenmaier, 1959a: 50. (*Hedychridium buyssonii* ssp.) HT, AT, 25 PT
spartana Linsenmaier, 1968: 16. (*Holopyga mlokosiewitzi* ssp.) HT, 3 PT
spatium Linsenmaier, 1959a: 59. (*Hedychridium chloropygum* ssp.) HT, AT, 1 PT
speculiventre Linsenmaier, 1994a: 154. (*Holopyga*)
spilota Linsenmaier, 1951: 52. (*Chrysis (Chrysogona)*) 5 PT
spinifugax Linsenmaier, 1999: 132. *Chrysis (Chrysis)* HT [2 PT]
stenodactylum Linsenmaier, 1994a: 165. (*Hedychridium (Hedychridium)*)
stigmaticornis Linsenmaier, 1968: 111. (*Chrysis (Cornuchrysis)*) HT, AT, 58 PT
stoeckherti Linsenmaier, 1959a: 53. (*Hedychridium*) HT, AT, 9 PT
striafoveata Linsenmaier, 1985: 438. (*Neochrysis (Neochrysis)*) HT, AT
striatidorsa Linsenmaier, 1984: 206. (*Chrysis (Trichrysis)*) HT, AT, 13 PT
striatifacialis Linsenmaier, 1968: 133. (*Chrysis (Chrysis)*) HT
subaequalis Linsenmaier, 1968: 62. (*Chrysis (Chrysis) grohmanni* ssp.) HT, AT, 28 PT
subaheneum Linsenmaier, 1959a: 55. (*Hedychridium incrassatum* ssp.) 1 PT
subanalis Linsenmaier, 1968: 94. (*Chrysis (Chrysis)*) HT
subaurotecta Linsenmaier, 1959a: 127. (*Chrysis (Chrysis)*) HT, AT, 5 PT
subcoriacea Linsenmaier, 1959a: 160. (*Chrysis (Chrysis) longula* ssp.) HT, AT, 11 PT
subcalens Linsenmaier, 1951: 90. (*Stilbum calens* var.) 4 ST
subcoriaceum Linsenmaier, 1999: 81. (*Hedychridium (Hedychridium)*) HT
subdistincta Linsenmaier, 1968: 110. (*Chrysis (Cornuchrysis)*) HT
subgermari Linsenmaier, 1959a: 116. (*Chrysis (Chrysis) germari* ssp.) HT, AT, 10 PT
subglabrata Linsenmaier, 1994a: 153. (*Holopyga*)
subincisa Linsenmaier, 1959a: 140. (*Chrysis (Chrysis)*) HT, AT, 8 PT
sublongula Linsenmaier, 1951: 76. (*Chrysis (Chrysis) longula* var.) 12 ST [3 ST]
subparvulum Linsenmaier, 1968: 19. (*Hedychrum intermedium* ssp.) HT, AT, 14 PT
subreticulatum Linsenmaier, 1999: 68. (*Hedychridium (Hedychridium)*) HT

- subroseum* Linsenmaier, 1959a: 60. (*Hedychridium*) HT, AT, 1 PT
subtilia Linsenmaier, 1999: 211. (*Chrysis (Chrysis) pilosalateralis* ssp.) HT
sulcianalis Linsenmaier, 1968: 132. (*Chrysis (Chrysis) obscuriventris* ssp.) HT, AT, 1 PT
sulcipleuralis Linsenmaier, 1985: 444. (*Neochrysis (Neochrysis)*) HT
superleucocheila Linsenmaier, 1985: 470. (*Neochrysis (Ipsiura)*) HT, 1 PT
surinamensis Linsenmaier, 1985: 468. (*Neochrysis (Ipsiura)*) HT
sybaritoides Linsenmaier, 1968: 83. (*Chrysis (Chrysis)*) HT, AT
syriensis Linsenmaier, 1959a: 133. (*Chrysis (Chrysis) daphnis* ssp.) HT, AT, 1 PT
tantilla Linsenmaier, 1968: 74. (*Chrysis (Chrysis)*) HT, AT
taurusiacus Linsenmaier, 1987: 144. (*Euchroeus (Spinolia) dallatorreanus* ssp.) HT, AT, 8 PT
taurusiensis Linsenmaier, 1959a: 162. (*Chrysis (Chrysis) obtusidens* ssp.) HT
tedshensis Linsenmaier, 1968: 60. (*Chrysis (Chrysis)*) HT, 1 PT
tegularis Linsenmaier, 1999: 138. (*Chrysis (Chrysis)*) HT, AT, 7 PT
temperatum Linsenmaier, 1959a: 57. (*Hedychridium flavipes* ssp.) AT, 3 PT
tenerifense Linsenmaier, 1968: 32. (*Hedychridium (Hedychridium)*) HT
tenerifensis Linsenmaier, 1959a: 21. (*Omalus (Philoctetes)*)
tenuiantennis Linsenmaier, 1999: 145. (*Chrysis (Chrysis)*)
tenuimediatata Linsenmaier, 1968: 53. (*Chrysis (Papuachrysis)*) 1 PT
tenuispina Linsenmaier, 1985: 451. (*Neochrysis (Neochrysis)*) HT
tenuitaris Linsenmaier, 1969: 372. (*Holopyga*) HT
testaceum Linsenmaier, 1968: 20. (*Hedychrum*) HT, AT, 1 PT
teutonica Linsenmaier, 1985: 469. (*Neochrysis (Ipsiura)*) HT, 5 PT
tizintestica Linsenmaier, 1997a: 269. (*Chrysis (Chrysogona)*) HT, 2 PT
tiznitensis Linsenmaier, 1999: 236. (*Chrysis (Cormuchrysis)*) HT, AT, 1 PT
transstriata Linsenmaier, 1985: 454. (*Neochrysis (Neochrysis)*) HT
trapeziphora Linsenmaier, 1987: 136. (*Holopyga (Holopyga)*) HT
tricavatum Linsenmaier, 1993: 723. (*Hedychridium*)
tricolor Linsenmaier, 1999: 17. (*Omalus (Omalus) punctulatus* ssp.) HT, AT, 1 PT
tricoloricornis Linsenmaier, 1968: 130. (*Euchroeus (Pseudospinolia)*) HT
trinidadensis Linsenmaier, 1984: 210. (*Chrysis (Trichrysis)*) HT, AT, 2 PT
tristicula Linsenmaier, 1959a: 115. (*Chrysis (Chrysis) succincta* ssp.) HT, 1 PT
tschadensis Linsenmaier, 1968: 63. (*Chrysis (Chrysis)*) HT
tsunekii Linsenmaier, 1959a: 155. (*Chrysis (Chrysis) sinensis* ssp.) HT, AT, 13 PT
tsunekii Linsenmaier, 1959a: 60. (*Hedychridium*) HT, AT
tunesiense Linsenmaier, 1959a: 64. (*Hedychridium mediocre* ssp.) HT
tunisica Linsenmaier, 1999: 180. (*Chrysis (Chrysis) consanguinea* ssp.) HT
tunisiana Linsenmaier, 1959a: 175. (*Chrysis (Cornuchrysis)*) HT, 6 PT
turca Linsenmaier, 1997a: 272. (*Chrysis (Chrysis) pyrogaster* ssp.) HT, AT, 5 PT
turca Linsenmaier, 1987: 136. (*Holopyga (Holopyga) cypruscula* ssp.) HT, AT, 1 PT
turceyana Linsenmaier, 1959a: 105. (*Chrysis (Chrysis)*) HT
turceyanus Linsenmaier, 1968: 5. (*Cleptes*) HT
turceyanus Linsenmaier, 1987: 144. (*Euchroeus (Euchroeus) purpuratus* ssp.) HT, AT, 3 PT
turceyense Linsenmaier, 1968: 30. (*Hedychridium (Hedychridium) krajniki* ssp.) HT
turcmenicus Linsenmaier, 1968: 13. (*Omalus (Notozus)*) HT
turmalina Linsenmaier, 1984: 221. (*Chrysis (Trichrysis)*) HT, AT, 21 PT
tussaci Linsenmaier, 1999: 33. (*Holopyga (Holopyga)*)
tussaci Linsenmaier, 1999: 68. (*Hedychridium (Hedychridium)*)
ulconota Linsenmaier, 1985: 478. (*Neochrysis (Ipsiura)*) HT, 1 PT
ultramonticola Linsenmaier, 1968: 97. (*Chrysis (Chrysis) violenta* ssp.) 1 PT
umbofacialis Linsenmaier, 1993: 727. (*Chrysis (Chrysis)*) HT, AT, 6 PT
uniformis Linsenmaier, 1959a: 54. (*Hedychridium elegans* ssp.) HT, 1 PT
unirubrum Linsenmaier, 1999: 65. (*Hedychridium (Hedychridium)*) HT, 1 PT
unitasculpta Linsenmaier, 1968: 14. (*Holopyga*) HT
urakensis Linsenmaier, 1968: 60. (*Chrysis (Chrysis)*) HT
urfana Linsenmaier, 1968: 132. (*Chrysis (Chrysis)*) HT, AT
urfanum Linsenmaier, 1968: 128. (*Hedychridium (Hedychridium)*) HT
valesianum Linsenmaier, 1959a: 53. (*Hedychridium stoeckherti* ssp.) HT, AT, 11 PT
valesiense Linsenmaier, 1959a: 62. (*Hedychridium*) HT, AT, 12 PT
valkeilai Linsenmaier, 1968: 93. (*Chrysis (Chrysis)*) HT
vanlithi Linsenmaier, 1959a: 153. (*Chrysis (Chrysis) rutiliventris* ssp.) HT, AT, 6 PT
vareana Linsenmaier, 1959a: 131. (*Chrysis (Chrysis) bidentata* ssp.) HT, AT, 4 PT

venezuelensis Linsenmaier, 1985: 448. (*Neochrysis (Neochrysis)*) HT
verhoeffi Linsenmaier, 1959a: 119. (*Chrysis (Chrysis)*) HT, AT
verhoeffi Linsenmaier, 1959a: 50. (*Hedychridium*) HT, AT, 6 PT
vicina Linsenmaier, 1984: 210. (*Chrysis (Trichrysis)*) HT, 2 PT
vicissituda Linsenmaier, 1994a: 155. (*Holopyga*) HT, AT, 6 PT
victorianus Linsenmaier, 1982: 327. (*Euchroeus (Primeuchroeus)*)
viennensis Linsenmaier, 1959a: 131. (*Chrysis (Chrysis) cingulicornis* ssp.) HT, AT, 17 PT
vigora Linsenmaier, 1959a: 31. (*Holopyga*) HT, 1 PT
vinaria Linsenmaier, 1968: 107. (*Chrysis (Platycelia) ehrenbergi* ssp.) HT, AT, 72 PT
violenta Linsenmaier, 1968: 97. (*Chrysis (Chrysis)*) HT
virideaurata Linsenmaier, 1951: 16. (*Holopyga amoenula* var.) HT
viridicupreum Linsenmaier, 1993: 722. (*Hedychridium*) HT, 1 PT [1 PT]
viridicyanea Linsenmaier, 1968: 63. (*Chrysis (Chrysis)*) HT, AT, 5 PT
viridiluteum Linsenmaier, 1999: 78. (*Hedychridium (Hedychridium) tyro* ssp.) HT, AT, 2 PT
viridiminor Linsenmaier, 1999: 19. (*Omalus (Omalus)*) HT
viridirosea Linsenmaier, 1959a: 143. (*Chrysis (Chrysis)*) HT, AT, 3 PT
viridisulcatum Linsenmaier, 1968: 25. (*Hedychridium (Hedychridium)*) HT, AT, 3 PT
viridiviolacea Linsenmaier, 1959a: 143. (*Chrysis (Chrysis)*) HT
w-carinata Linsenmaier, 1982: 337. (*Chrysis (Chrysis)*) HT, AT, 2 PT
wahrmanni Linsenmaier, 1957: 169. (*Chrysis (Spintharichrysis)*) HT
warnckeii Linsenmaier, 1999: 198. (*Chrysis (Chrysis)*) HT, AT
wolfi Linsenmaier, 1999: 165. (*Chrysis (Chrysis)*) HT, AT, 2 PT
wolfi Linsenmaier, 1959b: 234. (*Hedychridium*) HT
yallingupia Linsenmaier, 1982: 342. (*Chrysis (Hexachrysis)*) 2 PT
yanchepius Linsenmaier, 1982: 328. (*Euchroeus (Primeuchroeus)*) 3 PT
yermasoyense Linsenmaier, 1959a: 50. (*Hedychridium verhoeffi* ssp.) HT
yuccatana Linsenmaier, 1985: 438. (*Neochrysis (Neochrysis)*) HT
yuccatanensis Linsenmaier, 1984: 205. (*Chrysis (Trichrysis)*)
zadensis Linsenmaier, 1997a: 280. (*Chrysis (Chrysis) mediata* ssp.) HT, AT, 7 HT
zimmermanni Linsenmaier, 1959a: 181. (*Stilbum calens* ssp.) HT, AT, 2 PT [48 PT]

Replacement names given by Linsenmaier

aequicolor Linsenmaier, 1968: 101 (*Chrysis (Chrysis) fulgida* Linnaeus ssp.). Replacement name for *C. concolor* Mocsáry, 1912 nec Mocsáry, 1892.
afghanica Linsenmaier, 1968: 68 (*Chrysis (Chrysis)*). Replacement name for *C. succincta* ssp. *komareki* var. *uldarichi* Balthasar, 1957 [quadrinomial unavailable].
agadirana Linsenmaier, 1968: 48 (*Chrysogona*). Replacement name for *C. agadirensis* Linsenmaier, 1959a nec du Buysson, 1911.
canarianum Linsenmaier, 1987: 140 (*Hedychridium*). Replacement name for *H. canariense* Linsenmaier, 1968 nec Garcia Mercet, 1915.
castigata Linsenmaier, 1959a: 155 (*Chrysis (Chrysis) exsulans* Dahlbom ssp.). Replacement name for *C. asiatica* Linsenmaier, 1951 nec Radoszkowski, 1889.
castiliana Linsenmaier, 1968: 97 (*Chrysis (Chrysis) rutiliventris* Abeille ssp.). Replacement name for *C. dusmeti* Trautmann, 1926 nec *dusmeti* Trautmann, 1926.
caucasiensis Linsenmaier, 1959a: 146 (*Chrysis (Chrysis) analis* Spinola ssp.). Replacement name for *C. caucasica* Mocsáry, 1912 nec Mocsáry, 1889.
cypruscula Linsenmaier, 1959a: 120 (*Chrysis (Chrysis)*). Replacement name for *C. cypriana* Linsenmaier, 1951 nec Balthasar, 1953.
decendentata Linsenmaier, 1959a: 167 (*Chrysis (Chrysis)*). Replacement name for *C. insperata* Mocsáry, 1914 nec Chevrier, 1870.
facetana Linsenmaier, 1968: 101 (*Chrysis (Chrysis) fouqueti* var.). Replacement name for *C. faceta* Mocsáry, 1912 nec Aaron, 1885.
gracilia Linsenmaier, 1959a: 125 (*Chrysis (Chrysis) soror* ssp.). Replacement name for *C. gracilis* Trautmann, 1927 nec Schenck, 1856.
interrogata Linsenmaier, 1959a: 137 (*Chrysis (Chrysis) elegans* Lepeletier ssp.). Replacement name for *C. elegans* var. *smaragdula* Trautmann, 1926.
longiglossa Linsenmaier, 1959a: 166 (*Chrysis (Pentachrysis)*). Replacement name for *Chrysis carinata* Bischoff, 1910: 448, nec Bloch, 1799.
melaniventris Linsenmaier, 1997a: 273 (*Chrysis (Chrysogona)*). Replacement name for *C. obscuriventris* Linsenmaier, 1968

- nec* Mocsáry, 1914.
nilensis Lisenmaier, 1959a: 121 (*Chrysis (Chrysis)*). Replacement name for *C. cyanea* du Buysson, 1908 *nec* Linnaeus, 1758.
nipponicola Lisenmaier, 1968: 100 (*Chrysis (Chrysis) longula* Abeille ssp.). Replacement name for *C. nipponica* Lisenmaier, 1951 *nec* Uchida, 1933.
orientica Lisenmaier, 1959a: 149 (*Chrysis (Chrysis) comparata* Lepeletier ssp.). Replacement name for *C. orientalis* Mocsáry, 1889 *nec* Guérin-Menéville, 1842.
schencki Lisenmaier, 1968: 99 (*Chrysis (Chrysis) ignita* (Linnaeus) ssp.). Replacement name for *C. schenckiana* Lisenmaier, 1951 *nec* Mocsáry, 1912.

Unnecessary replacement names given by Lisenmaier

- buyssoni* Lisenmaier, 1959a: 37 (*Hedychrum*). Replacement name for *H. lucidulum* var. *antigai* du Buysson (in André), 1896.
[H. *antigai* du Buysson is a valid name]
devia Lisenmaier, 1959a: 170 (*Chrysis (Trichrysis)*). Replacement name for *C. cypria* Mocsáry, 1902 *nec* Buysson, 1897.
[Semenov-Tian-Shanskij 1954 already introduced the replacement name *C. lacerta* for *C. cypria* nec Buysson, 1897]
filiacialis Lisenmaier, 1959a: 105 (*Chrysis (Chrysis)*). Replacement name for *C. facialis* f. *athalia* Balthasar, 1953. [*C. facialis* f. *athalia* Balthasar is a valid name]
helleni Lisenmaier, 1959a: 113 (*Chrysis (Chrysis)*). Replacement name for *C. succincta* ab. *chrysoprasina* Hellén, 1919 [as explained in Paukkunen et al. (2014), the name *C. succincta* ab. *chrysoprasina* Hellén is not available, because described as an aberratio; it was raised to variety (var.) level by Trautmann (1927), thus making them available as species or subspecies names according to the rules of the ICBN (1999, article 45.6.3.). However, *C. succincta* var. *chrysoprasina* Trautmann, 1927 is homonym of *Chrysis chrysoprasina* Förster, 1853. Balthasar (1953) and later Lisenmaier (1959) introduced the replacement name *helleni* for the taxon. The authorship of *helleni* should be attributed to Balthasar, not Lisenmaier, as noted already by Vikberg (1986)].
ignifacialis Lisenmaier, 1959a: 115 (*Chrysis (Chrysis)*). Replacement name for *C. succincta* var. *ignifacies* Garcia Mercet, 1904. [*C. succincta* var. *ignifacies* Garcia Mercet is a valid name]
lampadum Lisenmaier, 1959a: 58 (*Hedychridium*). Replacement name for *H. lampas* (Christ, 1791). [*H. lampas* Christ is a valid name; Lisenmaier (1997a) reported that in 1959a erroneously wrote "nom. n. = *lampas* Christ, 1791" instead of "spec. nov.". The name is anyway published as a replacement name, and its description cannot be considered as the description of a valid species]
limassolense Lisenmaier, 1959a: 59 (*Hedychridium roseum* (Rossi) ssp.). Replacement name for *H. roseum* var. *cypriacum* Balthasar, 1953. [*H. roseum* var. *cypriacum* Balthasar is a valid name]
maculiventre Lisenmaier, 1959a: 63 (*Hedychridium*). Replacement name for *H. sculpturatum* var. *palestinense* Balthasar, 1953. [*H. sculpturatum* var. *palestinense* Balthasar is a valid name]
ortegae Lisenmaier, 1997a: 249 (*Omalus (Philoctetes)*). Replacement name for *O. ortegai* Lisenmaier, 1993. [the original combination was correct; Lisenmaier (1997a) replaced *O. ortegai* with *O. ortegae*, in contrast with the gender of the genus *Omalus*; it should be considered as an incorrect subsequent spelling]
sculpturatissimus Lisenmaier, 1959b: 235 (*Hedychridium maculiventre* Lisenmaier ssp.). Replacement name for *H. sculpturatum* var. *palestinense* Balthasar, 1953. [*H. sculpturatum* var. *palestinense* Balthasar is a valid name]

Genus-group names described by Lisenmaier

All of the genus-group names (definition of the Code) described by Lisenmaier are herein listed in alphabetical order. Lisenmaier only described subgenera, but some (*Ipsiura*, *Neochrysis*, *Praestochrysis*, *Primeuchroeus*, *Prochridium*, and *Pseudospinolia*) were later considered as valid genera by different authors. *Neochrysis* and *Primeuchroeus* were later recognized as valid genera by Lisenmaier, too.

- Afrospinolia* Lisenmaier, 1968: 42. Type species: *Euchroeus katanganus* Lisenmaier, 1968. Original designation. New subgenus in the genus *Euchroeus* Latreille, 1809.
Brethesia Lisenmaier, 1985: 461. Type species: *Chrysis ameghinoi* Bréthes, 1902. Original designation and monobasic. New subgenus in the genus *Neochrysis* Lisenmaier, 1959a.
Chamaeholopyga Lisenmaier, 1987: 137. Type species: *Holopyga parvicornis* Lisenmaier, 1987. Original designation and monobasic. New subgenus in the genus *Holopyga* Dahlbom, 1845.
Chrysidella Lisenmaier, 1997a: 260. Type species: *Chrysidea siamensis* Bischoff, 1910. Original designation. New subgenus in the genus *Primeuchroeus* Lisenmaier, 1968.
Exsecocrysis Lisenmaier, 1985: 462. Type species: *Chrysis gracilia* Lisenmaier, 1985. Original designation. New subgenus in the genus *Neochrysis* Lisenmaier, 1959a.
Ipsiura Lisenmaier, 1959a: 74. Type species: *Chrysis marginalis* Brullé, 1846. Original designation. New subgenus in the

genus *Pleurocera* Guérin-Menéville, 1842.
Neochrysis Linsenmaier, 1959a: 74. Type species: *Chrysis punctatissima* Spinola, 1840. Original designation. New subgenus in the genus *Pleurocera* Guérin-Menéville, 1842.
Neospinolia Linsenmaier, 1968: 39. Type species: *Chrysis tertrinii* du Buysson, 1898. Original designation and monobasic. New subgenus in the genus *Euchroeus* Latreille, 1809.
Papuachrysis Linsenmaier, 1968: 52. Type species: *Chrysis alces* Linsenmaier, 1968. Original designation and monobasic. New subgenus in the genus *Chrysis* Linnaeus, 1761.
Praestochrysis Linsenmaier, 1959a: 164. Type species: *Chrysis shanghaiensis* Smith, 1874. Original designation. New subgenus in the genus *Chrysis* Linnaeus, 1761.
Primeuchroeus Linsenmaier, 1968: 38. Type species: *Chrysis papuanus* Mocsáry, 1889. Original designation. New subgenus in the genus *Euchroeus* Latreille, 1809.
Prochridium Linsenmaier, 1968: 21. Type species: *Holopyga hirtipes* Mocsáry, 1902. Original designation. New subgenus in the genus *Hedychridium* Abeille de Perrin, 1878.
Prospinolia Linsenmaier, 1968: 40. Type species: *Chrysis theresae* du Buysson, 1900. Original designation and monobasic. New subgenus in the genus *Euchroeus* Latreille, 1809.
Pseudospinolia Linsenmaier, 1951: 31. Type species: *Chrysis uniformis* Dahlbom, 1854 (= *Pseudochrysis* auct. nec Semenov). Original designation. New subgenus in the genus *Euchroeus* Latreille, 1809.
Spintharichrysis Linsenmaier, 1951: 56. Type species: *Chrysis versicolor* Spinola, 1808. Original designation. New subgenus in the genus *Chrysis* Linnaeus, 1761.

Replacement names in the genus-group names

Brethesiella Linsenmaier, 1987: 144. Replacement name for *Brethesia* Linsenmaier, 1985 nec Schrottky, 1909.
Hyalichroeus Linsenmaier, 1959a: 79. Replacement name for *Spintharis* Dahlbom, 1854, nec Klug, 1845.

APPENDIX B

List of the types housed in Linsenmaier's collection described by other authors

In the Linsenmaier collection there are primary and secondary types belonging to 130 taxa, described by other 30 authors. We here list the names of these types in alphabetical order.

afghana Balthasar, 1957 (*Chrysis viridula* ssp.) HT
albicornis Bohart in Bohart & Kimsey, 1982 (*Argochrysis*) 2 PT
alcudiae Reder & Arens, 2012 (*Chrysis*) HT
alpina Niehuis, 2000 (*Chrysis angustula* ssp.) 2 PT
anatolicum Arens, 2010 (*Hedychridium roseum* ssp.) 9 PT
apollon Arens, 2014 (*Cleptes*) 1 PT
apontis Bohart in Bohart & Kimsey, 1982 (*Chrysis*) 1 PT
arcadiae Arens, 2001 (*Chrysis*) 2 PT
arenicola Kimsey in Bohart & Kimsey, 1982 (*Minymischa*) 1 PT
armilla Bohart in Bohart & Kimsey, 1982 (*Argochrysis*) 2 PT
australia Bohart, 1964 (*Chrysis*) 1 PT
bequaerti Bohart, 1962 (*Chrysis*) 2 PT
bicolor Lepeletier, 1806 (*Chrysis*) NT (Rosa & Xu 2015)
bidentulum Lepeletier, 1806 (*Hedychrum*) NT (Rosa & Xu 2015)
boharti French in Bohart & Kimsey, 1982 (*Hedychrum*) 2 PT
borregoensis Telford, 1964 (*Parnopes*) 1 PT
californicus Huber & Pengelly, 1978 (*Elampus nitidus* ssp.) 1 PT
carrilloi Bohart & Brumley, 1967 (*Hedychridium*) 1 PT
chrysoprasina Trautmann, 1927 (*Chrysis succincta* var.) 1 PLT
collega Bohart in Bohart & Kimsey, 1982 (*Ceratochrysis*) 1 PT
concava Bohart in Bohart & Kimsey, 1982 (*Ceratochrysis*) 1 PT
corsuense Perraudin, 1978 (*Hedychridium mediocre* ssp.) HT, 4 PT
crassepuncta Semenov, 1954 (*Holopyga*) 1 PT
crotema Bohart, 1964 (*Chrysis*) 1 PT
cypriacum Balthasar, 1952 (*Hedychridium roseum* var.) 1 PT
defoveolata Balthasar, 1953 (*Chrysis (Tetrachrysis)*) 1 PT

demaculata Arens, 2004b (*Chrysis*) HT, 4 PT
downeyi Bohart & Campos, 1960 (*Omalus (Diplorrhos)*) 1 PT
elvira Balthasar, 1957 (*Chrysis*) 2 PT
eoia Semenov-Tian-Shanskij, 1912 (*Pseudochrysis*) 2 PT
etruscum Strumia, 2003 (*Hedychridium*) 1 PT
flos Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Cyrteuchrum*) 1 PT
graeca Arens, 2004b (*Chrysis ignicollis* ssp.) 2 PT
goloensis Strumia, 2013 (*Hedychridium*) HT
houskai Balthasar, 1953 (*Spintharis (Acanthospintharis)*) 1 PT
houskai Balthasar, 1953 (*Hedychridium*) 1 PT
hyalitarse Perraadin, 1978 (*Hedychridium reticulatum* ssp.) HT, 3 PT [7 PT]
igoriana Semenov, 1967 (*Chrysis (Gonochrysis)*) 1 PT
impressopunctata Arens, 2004a (*Holopyga*) 1 PT
inaequalis Dahlbom, 1845 (*Chrysis*) NT (Rosa & Vårdal 2015) NT
isiris Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Chrysis (Tetrachrysis) eversmanni* ssp.) 1 PT
kaszabi Móczár, 1967 (*Holopyga*) 2 PT
klapperichi Balthasar, 1957 (*Chrysis (Tetrachrysis)*) HT, 3 PT
koma Tsuneki, 1950 (*Chrysis (Holochrysis)*) 3 PT
komachi Tsuneki, 1954 (*Chrysis (Tetrachrysis)*) 3 PT
krombeini Bohart & Campos, 1960 (*Omalus (Diplorrhos)*) 1 PT
laevifallax Perraadin, 1978 (*Chrysis subsinuata* ssp.) HT, 4 PT [3 PT]
leptomandibularis Niehuis, 2000 (*Chrysis*) 17 PT
libussa Balthasar, 1953 (*Chrysis (Tetrachrysis)*) 1 PT
linsenmaieri Agnoli, 1995 (*Parnopes grandior* ssp.) 2 PT
litura Bohart in Bohart & Kimsey, 1982 (*Argochrysis*) 1 PT
lucifera Bohart in Bohart & Kimsey, 1982 (*Chrysis*) 2 PT
maculithorax Perraadin, 1978 (*Euchroeus (Pseudospinolia) humboldti* ssp.) HT, AT
manfredi Niehuis, 1996 (*Chrysura*) 30 PT
mareki Rosa, 2003b (*Cleptes (Leiocleptes)*) 1 PT
margaritacea Semenov (in Semenov-Tian-Shanskij & Nikol'skaya), 1954 (*Irenula*) 1 PT
mavromoustakisi Enslin, 1950 (*Hedychridium*) HT, 1 PT
mavromoustakisi Enslin, 1939 (*Holopyga*) HT, AT, 2 PT
minutum Bohart, 1980 (*Microchridium*) 1 PT
mirum Bohart, 1980 (*Hedychreides*) 2 PT
mongolicus Tsuneki, 1947 (*Euchroeus purpuratus* var.) 4 PT
mosadunense Lefebvre, 1986 (*Hedychridium*) 5 PT
neolateralis Bohart, 1966 (*Chrysis*) 1 PT
ottomanum Arens, 2010 (*Hedychridium chloropygum* ssp.) HT, 3 PT
perpunctatum Balthasar, 1953 (*Hedychridium*) 1 PT
phrygiensis Arens, 2001 (*Chrysis*) HT, AT, 9 PT
procera Zimmermann, 1954 (*Chrysis (Holochrysis)*) 2 PT
pumila Klug, 1845 (*Chrysis*) NT (Rosa & Xu 2015) NT
rivalis Bohart, 1964 (*Chrysis*) 4 PT
rhodojanthinum Enslin, 1939 (*Hedychridium*) HT
rhodosensis Móczár, 2000 (*Cleptes (Cleptes) nigritus* ssp.) HT
rubeum Bohart, 1980 (*Xerochrum*) 1 PT
sagmatis Bohart in Bohart & Kimsey, 1982 (*Chrysura*) 1982 1 PT
sapphirinum Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Zarudnidium*) 1 PT
schischmai Mader, 1933 (*Stilbum cyanurum* ab.) 1 ST
schmideggeri Rosa, 2004 (*Chrysis*) 1 PT
schusteri Bohart in Bohart & Kimsey, 1982 (*Chrysis*) 1 PT
scintilla Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Hedychridium*) 1 PLT
scutellaris Zimmermann, 1956 (*Holopyga*) 2 PT
simii Perraadin, 1978 (*Chrysis mysticalis* ssp.) HT, AT, 8 PT [3 PT]
spiloventer French in Bohart & Kimsey, 1982 (*Hedychrum*) 2 PT
succincta Linnaeus, 1767 (*Chrysis*) NT (Rosa & Xu 2015) NT
tatianae Semenov, 1967 (*Chrysis (Tetrachrysis)*) 2 PT
telfordi Bohart & Campos, 1960 (*Omalus*) 1 PT
tenellula Semenov-Tian-Shansky, 1910 (*Chrysis*) 2 PT
tensa Bohart, 1964 (*Chrysis*) 1 PT
tingitana Bischoff in Nadig & Nadig, 1935 (*Chrysis*) 3 PT

trilobatus Bohart & Campos, 1960 (*Omalus (Pseudomalus)*) 1 PT
tshingiz Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Ellampus*) 1 PT
turanum Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Euchrum*) 1 PT
turicum Arens, 2010 (*Hedychridium valesiense* ssp.) HT, 1 PT
tyrrhenicum Strumia, 2003 (*Hedychridium*) 1 PT
uldarichi Balthasar, 1957 (*Chrysis succincta komareki* var.) HT
vagabunda Bohart, 1964 (*Chrysis*) 2 PT
venustella Bohart, 1964 (*Chrysis*) 1 PT
vibex Bohart, 1964 (*Chrysis*) 2 PT
vigoroidea Arens, 2004a (*Holopyga*) 1 PT
viridescutellare Arens, 2004b (*Hedychridium*) HT, 2 PT
wahisi Niehuis, 1998b (*Hedychridium*) 1 PT
wasbaueri Bohart, 1962 (*Chrysis*) 2 PT
zarudnyi Semenov in Semenov-Tian-Shanskij & Nikol'skaya, 1954 (*Hedychrum*) 2 PT
zimmermanni Balthasar, 1953 (*Hedychridium*) 1 PT

APPENDIX C

Scientific publications by Walter Linsenmaier related to Chrysidae (in chronological order)

1. Linsenmaier, W. (1951) Die europäischen Chrysidae (Hymenoptera). Versuch einer natürlichen Ordnung mit Diagnosen. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 24 (1), 1–110. [30 April 1951]
2. Linsenmaier, W. & Bytinski-Salz, H. (1956) Chrysidae. In: Bytinski-Salz, H. (Ed.), Coleoptera and Hymenoptera from a journey through Asia Minor. I. *Revue de la Faculté des Sciences de l'Université d'Istanbul*, Série B, 21 (4), pp. 211–229. [(received) 1 April 1956]
3. Linsenmaier, W. (1957) *Chrysis (Spinharichrysis) wahrami* Linsenm. nov. spec. In: Bytinski-Salz, H. (Ed.), Coleoptera and Hymenoptera from a journey through Asia Minor. II. Descriptions of new species and forms. *Revue de la Faculté des Sciences de l'Université d'Istanbul*, 22 (3), pp. 13–170.
4. Linsenmaier, W. (1959a) Revision der Familie Chrysidae (Hymenoptera) mit besonderer Berücksichtigung der europäischen Spezies. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 32 (1), 1–232. [31 July 1959]
5. Linsenmaier, W. (1959b) Revision der Familie Chrysidae (Hymenoptera). Nachtrag. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 32 (2–3), 233–240. [28 October 1959]
6. Linsenmaier W. (1960) Cysididae [!] (Hymenoptera) from the Azores. Report N° 13 from the Lund University Expedition in 1957 to the Azores and Madeira. *Boletim do Museu Municipal do Funchal*, 13 (40), 118. [August 1960]
7. Linsenmaier, W. (1968) Revision der Familie Chrysidae (Hymenoptera). Zweiter Nachtrag. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 41 (1–4), 1–144. [20 November 1968]
8. Linsenmaier, W. (1969) The chrysidid wasps of Palestine (Hym., Chrysidae). A faunistic catalogue with description of new species and forms. *Israel Journal of Entomology*, 4 (2), 343–376.
9. Linsenmaier, W. (1982) Neue Chrysidae aus Indo-Australien (Hymenoptera). *Entomofauna*, 3 (21), 323–350. [15 September 1982]
10. Linsenmaier, W. (1984) Das Subgenus *Trichrysis* Lichtenstein in Nord- und Südamerika (Hym., Chrysidae, Genus *Chrysis* L.). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 57, 195–224. [15 October 1984]
11. Linsenmaier, W. (1985) Revision des Genus *Neochrysis* Linsenmaier, 1959 (Hymenoptera, Chrysidae). *Entomofauna*, 6 (26/1), 425–487. [15 December 1985]
12. Linsenmaier, W. (1987) Revision der Familie Chrysidae. (Hymenoptera). 4. Teil. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 60 (1–2), 133–158. [31 August 1987]
13. Linsenmaier, W. (1993) Neue Chrysidae von den Kanarischen Inseln (Insecta: Hymenoptera: Chrysidae). *Veröffentlichungen aus dem Übersee-Museum Bremen* (Naturwissenschaften), 12, 721–732.
14. Linsenmaier, W. (1994a) The Chrysidae (Insecta: Hymenoptera) of the Arabian Peninsula. *Fauna of Saudi Arabia*, 14, 145–206. [30 November 1994]
15. Linsenmaier, W. (1994b) Grundriss der *Chrysis ignita*-Gruppe von Nordamerika. (Hymenoptera, Chrysidae). *Entomofauna*, 15 (42), 481–500. [10 December 1994]
16. Linsenmaier, W. (1994c) Beiträge zu *Cleptes* Latreille, 1802 (Hymenoptera, Chrysidae). *Entomofauna*, 15 (45), 513–520. [10 December 1994]
17. Linsenmaier, W. (1997a) Altes und Neues von den Chrysidae (Hymenoptera, Chrysidae). *Entomofauna*, 18 (19), 245–300. [30 June 1997]
18. Linsenmaier, W. (1997b) Die Goldwespen der Schweiz. *Veröffentlichungen aus dem Natur-Luseum Luzern*, 9, 1–140. [summer 1997]
19. Linsenmaier, W. (1999) Die Goldwespen Nordafrikas (Hymenoptera, Chrysidae). *Entomofauna*, 10 (Supplement), 210 pp. [30 November 1999]

Linsenmaier published some colour drawings of Chrysididae in various popular science books, journals and other publications.

The most remarkable drawings are found in the followings publications:

1. Jünger, E. (1995) Subtile Jagden. Klett-Cotta Editor, Stuttgart, 228 pp. ISBN: 3-608-93310-7 [10 colour illustrations by W. Linsenmaier, hardcover with *Cleptes juengeri*].
2. Linsenmaier, W. (1972) The insects of the World. McGraw-Hill Company, 392 pp. [13 colour illustrations of Chrysididae and a cocoon, one line drawing of a *Chrysis* larva. *Chrysis scutellaris*; *Cleptes dubuyssonii*; *Cleptes ignitus*; *Hedychridium vachali*; *Chrysis* larva; *Chrysis ignifrons*; *Chrysis hemipyrrha*; *Euchroeus purpuratus* (pair); *Chrysis excavata*; *Chrysis fasciata daphne*; *Omalus purpuratus*; *Omalus* cocoon; *Stilbum viride*]. [June 1972] [Publication translated in different languages: e.g. Knaurs großes Insektenbuch, Droemer Knaur. München, 1972; "Insectes du Monde", Éditions Stock, Paris, 1973; "Insetti del Mondo", Arnoldo Mondadori Editore, Milano, 1974].